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1992 ANNUAL RCRA GROUNDWATER MONITORING REPORT FOR REGULATED UNITS AT THE ROCKY FLATS PLANT

— ADDENDUM —

September 1993

EG&G Rocky Flats, Inc.
Environmental Management Department

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EG&G Rocky Flats, Inc.
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EG&G ROCKY FLATS

INTEROFFICE CORRESPONDENCE

DATE: March 6, 1992

TO: P. L. Fuller, Remediation Programs Division, Bldg. T130B. X5744

FROM: R. B. Hoffman, Classification Office, T893B, X4598 SLC for RBH

SUBJECT: CLASSIFICATION EXEMPTION WAIVER FOR REMEDIATION PROGRAMS DIVISION (RPD) DOCUMENTS

Your request for exemption from classiification/UCNI review of Remediation Programs Division (RPD) documents as proposed in your letter of March 5, 1992 has been considered.

Based upon a substantial historical perspective, we have concluded that the reporting activities in which your Division of the Environmental Management Department is involved are unclassified and UCNI-free in nature and content.

All reporting activities for those Operable Units (OUs) one thru sixteen, except, Operable Unit 15 -- Inside Building Closures, can be considered as exempt from further classification/UCNI review by the Classification Office. This waiver includes internal, as well as, external letters, work plans, reports, interim measures, RCRA facilities investigations, interim remedial actions, site characterization studies, human health risk assessments, environmental evaluations and assessments, comparative analyses, and other environmental and administrative documentation, as outlined in your letter. At this time sufficient knowledge of the type of information which OU 15 will comprise has not been established and until this can be acertained, classification review will be necessary.

In general, should RPD documents begin to differ in scope and context from past practice, it will become mandatory that you contact this office to ensure that this classification review waiver be justified and correct.

Should you require any further information or have any questions regarding this matter, please feel free to contact me or Karl Dallarosa (X3792) at any time.

kld

cc:
P. S. Bunge
J. E. Evered
W. A. Hunt

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EXECUTIVE SUMMARY

In compliance with Colorado Hazardous Waste Act Regulations 6 CCR 1007-3, Subpart F, Section 265.90 for interim status waste management units, this addendum to the *1992 Annual Resource Conservation and Recovery Act (RCRA) Groundwater Monitoring Report* presents final results of the 1992 quarterly sampling and analyses of the three regulated interim status RCRA units (Solar Evaporation Ponds, West Spray Field, and Present Landfill) at Rocky Flats Plant (RFP). The purpose of the RCRA groundwater monitoring program at RFP is to monitor and determine the impact from RCRA-regulated units to groundwater in the uppermost aquifer. This addendum presents updated chemical concentration and radiological activity data, as well as updated statistical comparisons of these data. These updates were based on additional data received after submittal of the *1992 Annual Resource Conservation and Recovery Act Groundwater Monitoring Report*.

At the time of preparation of this addendum, results of analyses of 1,680 of the 1,681 samples had been received. Of these, 1,453 (86%) had been validated. None of the analytical results were rejected during validation.

Additional data did not significantly change the statistical interpretations of impacts to groundwater from the RCRA units. Some analyte data distributions were reinterpreted (i.e. analytes categories changed to infrequently detected, normally distributed, lognormally distributed, or non-parametrically distributed), and statistical comparisons were recalculated. Based on review and analysis of additional data, no changes to the *1992 Annual Resource Conservation and Recovery Act Groundwater Monitoring Report* interpretations of impact to groundwater have been made.

1.0 INTRODUCTION

This addendum to the *1992 Annual RCRA Groundwater Monitoring Report for Regulated Units at the Rocky Flats Plant* (1992 Report) completes the information required under the Colorado Hazardous Waste Act regulations 6 CCR 1007-3, Subpart F, 265.94. Data presented in this addendum include updated and additional results of groundwater chemical and radiological analyses for the three regulated units (Solar Evaporation Ponds, West Spray Field, and Present Landfill) at the Rocky Flats Plant (RFP) which were not available during preparation of the 1992 Report.

Changes to the 1992 Report include: addition to, and revision of the analytical results data bases (Appendix A of this addendum, corresponding to Appendix A of the 1992 Report); calculations of percent completeness and percent validation (Table 1); results of validation (Table 2); updated tables of infrequently detected analytes in upgradient and downgradient groundwater-monitoring wells (Tables 3, 4, 7, and 9, and Appendix B of this addendum, corresponding to Tables 2-6, 3-3, 4-5, and Sections 2.4, 2.5, 3.4, 3.5, 4.5, and 4.5 of the 1992 Report); updated tables of results of statistical comparisons of groundwater quality at upgradient and downgradient monitoring well locations using analysis of variance (ANOVA) (Tables 5, 6, 8, and 10, and Appendix C of this addendum, corresponding to Tables 2-7, 2-8, 3-4, 4-6, and Sections 2.4, 2.5, 3.4, 3.5, 4.5, and 4.5 of the 1992 Report); and revision of several chemical concentration "box" and contour maps to display additional data.

Additional results of chemical and radiological analyses received after the preparation of the 1992 Report have been combined with data used for the 1992 Report. The updated data bases are presented in Appendix A of this addendum. Data are divided into four groups: water quality parameters, metals, radionuclides, and volatile organic compounds (VOCs). Sampling and analysis protocols were presented in Section 1.0 of the 1992 Report.

Additional groundwater-quality data consists mostly of analytical results for samples collected during the fourth quarter of 1992. The new data base of analytical results (consisting of all 1992 data available as of May 23, 1993) was used to recalculate statistics for comparisons of

groundwater in upgradient well "pools" versus groundwater in individual downgradient wells for each of the three RCRA units. Data were also used to compare groundwater quality between individual downgradient locations (i.e., between downgradient wells). Methods used to calculate statistics and make comparisons were described in Section 1.2.3 of the 1992 Report.

Data presented in this addendum are in the process of being validated in accordance with Environmental Management Program Quality Assurance procedures. At the time this addendum was prepared, 1,453 of 1,681 results of analytical suites (not necessarily individual analytes) had been subjected to validation. Conclusions made in this addendum are, therefore, based on some unvalidated data. At the time data were received, no analytical results had been rejected as a result of the validation process. Percent completeness (based on the number of samples submitted to the laboratories versus the number of analytical results received) and percent validated (based on the number of sample results received from the lab versus the number of sample results having undergone validation) are presented in Table 1. The percentages in Table 1 suggest that RFP continues to improve laboratory turn-around and data validation times for RCRA groundwater monitoring data. Results of validation are presented in Table 2.

No additional groundwater-elevation data were received, since all data were provided in the March 1st report, and hence, no changes to the groundwater potentiometric-surface maps or interpretation of groundwater flow or site conceptual models have been made.

Changes to the interpretations and conclusions reached in the 1992 Report as a result of additional data received after the preparation of the 1992 Report are discussed in the following sections.

2.0 SOLAR EVAPORATION PONDS

2.1 Infrequently Detected Analytes

Tables 3 and 4 (also see Appendix B of this addendum) list infrequently detected analytes in upgradient and downgradient wells near the Solar Evaporation Ponds. Analytes were classified

as infrequently detected if they were detected in fewer than 50 percent of the samples analyzed for any given well, or if there were fewer than two reported analytical results for that analyte for the year in any given well. Tables 3 and 4 also list the concentrations of these infrequently detected analytes, along with their laboratory qualifiers.

Additional infrequently detected analytes not listed on Table 2-6 of the 1992 Report include tritium (from Well 3787 on 4/14/92), radium-226 (from Well P209789 on 10/16/92), total suspended solids (from Well 2686 on 1/30/92, Well 2686 on 4/14/92, and Well P209789 on 10/16/92), and cyanide (from Well 3787 on 4/14/92) for wells screened in quaternary material, and tritium (from Well 3086 on 10/9/92 and Well P209489 on 10/15/92), mercury (from Well P209489 on 1/30/92 and 4/24/92), and total suspended solids (from Well P209589 on 4/10/92) for wells screened in bedrock.

Additional analytical results for gross alpha, gross beta, soluble fluoride, and orthophosphate in quaternary-material groundwater; and gross alpha, uranium-233/234, uranium-235, uranium-238, strontium-89/90, carbonate, soluble fluoride, fluoride, and nitrate/nitrite concentrations in bedrock groundwater, moved these analytes from the "infrequently detected" category in some wells to the "analytes with greater than 50-percent detection" category.

2.2 ANOVA Comparisons

Tables 5 and 6 (also see Appendix C of this addendum) list analytes that were detected with greater than 50-percent frequency in samples from any particular upgradient or downgradient well. Data-type distribution (i.e., normal, log normal, or non-parametric) and probabilities of differences in analyte concentrations being statistically significant are also presented. Additional analytes (not included in the 1992 Report) having statistically significant differences between the upgradient well POOL and downgradient wells, or between individual downgradient wells, include: magnesium, strontium, silicon, gross alpha, and americium-241 (total) for groundwater in quaternary materials; and bicarbonate (as $CaCO_3$), silicon, 1,2-dichloroethene, carbon tetrachloride, trichloroethene, gross alpha, total radiocesium, and tritium (total) for bedrock groundwater. Results of recalculation of ANOVA tests using the updated data bases of chemical

concentrations indicate no statistically significant differences between the upgradient well POOL and downgradient wells, or between individual downgradient wells for barium in quaternary-material groundwater, or for radium-226 in bedrock groundwater.

2.3 Groundwater Quality

Additional data for radioactive species were primarily results of analyses of fourth-quarter samples. Additional data led to no significant changes in the interpretation of the distribution of gross alpha or gross beta activities for groundwater in either quaternary materials or weathered bedrock. Figures 2-1 and 2-2 present gross alpha and gross beta activities for groundwater in quaternary materials and weathered bedrock, respectively. Gross alpha activities exceeded sitewide background values in quaternary-material groundwater from Well 2886, and in weathered-bedrock groundwater from Wells 3086, B208689, and P208989. Gross beta activities exceeded sitewide background values in quaternary-material groundwater from Wells 2886 and B208589, and in weathered-bedrock groundwater from Wells 3086, B208689, P208989, P209889, and P209489. Results of radioactivity analyses qualified by the laboratory with a "U" (compound was analyzed for, but not detected), "B" (reported value is less than the contract-required detection limit, but greater than the instrument detection limit), or "J" (reported value is greater than the instrument detection limit, but control sample analysis is not within control limits - value is estimated) are listed as "BDL" (below detection limits) in the figures.

Additional results of activities of uranium-233/234, uranium-235, and uranium-238 did not lead to any significant changes in the interpretation of the distribution of activities for these species (see Figures 2-3 and 2-4). Uranium-233/234 was detected at activities above sitewide background values in quaternary-material groundwater from Well 2886, and in weathered-bedrock groundwater from Wells B208689, 3086, and P208989. Uranium-235 was detected at activities above sitewide background values in quaternary-material groundwater from Wells B208589, 1786, and 2886, and in weathered-bedrock groundwater from Wells B208689, P209889, 3086, and P208989, and P209489. Uranium-238 was detected at activities above

sitewide background values in quaternary-material groundwater from Well 2886, and in weathered-bedrock groundwater from Wells B208689, 3086, and P208989.

Additional results of activities of tritium, americium-241, and plutonium-239/240 did not lead to any significant changes in the interpretation of the distribution of activities for these species (see Figures 2-5 and 2-6). Tritium was detected at activities above sitewide background values in quaternary-material groundwater from Wells 1786, B208589, B210489, B208089, 2886, P209789, 3586, 2187, 3887, 2686, P207689, 3787, P207489, 5687, and 2286. Tritium was detected at activities above sitewide background values in weathered-bedrock groundwater from Wells P209889, P208989, 3086, P209589, B208189, P209489, P209189, P209389, P210189, and P207389. Americium-241 was detected at activities above sitewide background values in quaternary-material groundwater from Well 2286, and in weathered-bedrock groundwater from Well P209189. Plutonium-239/240 was detected at activities above sitewide background values in quaternary-material groundwater from Well 2286, and in weathered-bedrock groundwater from Well P209189.

Additional results of activities of strontium-89/90, cesium-137, radium-226, and radium-228 did not lead to any significant changes in the interpretation of the distribution of activities for these species (see Figures 2-7 and 2-8). Strontium-89/90 was detected at activities above sitewide background values in weathered-bedrock groundwater from Wells P208989, P209889, and 3086. Cesium-137 was detected at activities above sitewide background values in quaternary-material groundwater from Wells 2286 and 1786. Radium-226 was detected at activities above sitewide background values in quaternary-material groundwater from Wells 1786, 2886, and 2286, and in weathered-bedrock groundwater from Wells P208989, B208689, P209889, 3086, P210189, and P209489. Radium-228 was detected at activities above sitewide background values in weathered-bedrock groundwater from Wells P208989 and P209889.

Additional water-quality data for Well 2986 indicate that during the second quarter of 1992, the concentration of nitrate/nitrite in groundwater from this well was 20 milligrams per liter (mg/l). Interpretation of these new data suggests that the 10 mg/l isopleth line for nitrate/nitrite

concentrations should extend farther eastward than depicted on Figure 2-16 of the 1992 report and should encompass Well 2986 (see Figure 2-9).

Additional water-quality data for Well 3787 indicate that during the second quarter of 1992, the concentration of fluoride in groundwater from this well was 2 mg/l. These additional data do not change size or shape of the interpreted-concentration contour lines.

Sulfate-concentration contour lines were not drawn around Well 3586 or Well 3686 on Figure 2-18 of the 1992 Report. These lines have been added and are presented on Figure 2-10.

Additional results of volatile organic analyses (VOAs) indicate that toluene was detected in fourth-quarter groundwater in Well P209789 at 8 micrograms per liter (μg/l). Acetone, benzene, toluene, and total xylenes were detected in fourth-quarter groundwater in Well 2386. Toluene was detected in fourth-quarter groundwater in Well 2786 at 6 μg/l. Figures 2-11 and 2-12 list concentrations of detected VOCs in quaternary-material groundwater and weathered-bedrock groundwater, respectively, and include laboratory qualifiers. Results qualified as "U" (not detected) or "J" (value is estimated - spectral identification criteria are met, but the value is below contract-required quantitation limits) are not listed in Figures 2-11 or 2-12. Concentrations of analytes that are common laboratory contaminants and that were also detected in laboratory method blanks (i.e., methylene chloride and acetone) are also not listed in Figures 2-11 or 2-12, except where common laboratory contaminants are also detected in other quarters and not qualified with a "B." (A "B" laboratory qualifier indicates that the analyte was also detected in the laboratory method blank.)

2.4 Conclusions

Results of additional analyses support the original conclusions made in the 1992 Report. In general, results of analyses show that the uppermost aquifer (for this report assumed to be composed of the quaternary materials and weathered bedrock) has been impacted by leakage from the Solar Evaporation Ponds. Higher concentrations of VOCs are typically found in both quaternary-material wells and weathered-bedrock wells immediately adjacent to Pond 207-C.

The most significant inorganic analyte detected in either quaternary-material groundwater or weathered-bedrock groundwater was nitrate/nitrite. Concentrations of nitrate/nitrite, sulfate, and fluoride were typically highest in monitoring wells located north of the ponds. Activities of radionuclides were detected above background levels in groundwater from both quaternary materials and weathered bedrock. Activities of these analytes were typically highest adjacent to the Solar Evaporation Ponds area and along North Walnut Creek.

3.0 WEST SPRAY FIELD

3.1 Infrequently Detected Analytes

Table 7 (also see Appendix B) lists infrequently detected analytes in upgradient and downgradient wells for the West Spray Field RCRA Unit. Analytes were classified as infrequently detected if they were detected in fewer than 50 percent of the samples for any given well, or if there were fewer than two reported analytical results for the year in any given well. Table 7 also lists the concentrations of these infrequently detected analytes, along with their laboratory qualifiers.

Additional infrequently detected analytes not listed on Table 3-3 of the 1992 Report include orthophosphate (from Well B110989 on 1/29/92 and 4/29/92) and carbonate (from Well B410589 on 7/29/92).

Additional analytical results for methylene chloride, chromium, and soluble fluoride concentrations moved these analytes in some wells from the "infrequently detected" category to the "analytes with greater than 50-percent detection" category.

3.2 ANOVA Comparisons

Table 8 (also see Appendix C of this addendum) lists analytes that were detected with greater than 50-percent frequency in any particular upgradient or downgradient well. Data-type distribution (i.e., normal, log normal, or non-parametric) and probabilities of differences in

analyte concentrations being statistically significant are also presented. Additional analytes (not included in the 1992 Report) having statistically significant differences between the upgradient well POOL and downgradient wells, or between individual downgradient wells include: vanadium, bicarbonate (as $CaCO_3$), and uranium-238 (concentrations of methylene chloride, chromium, and soluble fluoride detected at a greater than 50 percent frequency were discussed in the 1992 Report.) Although additional data moved methylene chloride, chromium and soluble fluoride concentrations in some wells from the "infrequently detected" category to the "greater than 50-percent detected" category, these additional data did not change the interpretation of distribution of these analytes. Results of recalculation of ANOVA tests using the updated data base of chemical concentrations indicate that no statistically significant differences between the upgradient well POOL and downgradient wells, or between individual downgradient wells exist for tritium.

3.3 Groundwater Quality

Additional data for radioactive species consisted primarily of results of analyses of fourth-quarter samples. Additional data led to no significant changes in the interpretation of the distribution of gross alpha or gross beta activities for groundwater in either quaternary material or weathered bedrock. Figure 3-1 presents gross alpha and gross beta activities for groundwater. No reported gross alpha or gross beta activities exceeded sitewide background values. Results of radioactivity analyses qualified by the laboratory with a "U" (compound was analyzed for, but not detected), "B" (reported value is less than the contract-required detection limit, but greater than the instrument detection limit), or "J" (reported value is greater than the instrument detection limit, but control sample analysis is not within control limits - value is estimated) are listed as "BDL" (below detection limits) in the figures.

Additional results of activities of uranium-233/234, uranium-235, and uranium-238 did not lead to any significant changes in the interpretation of the distribution of activities for these species (see Figure 3-2). There were no reported activities of uranium-233/234, uranium-235, or uranium-238 above sitewide background values.

Additional results of activities of tritium, americium-241, and plutonium-239/240 did not lead to any significant changes in the interpretation of the distribution of activities for these species (see Figure 3-3). Tritium was detected at activities above sitewide background values in quaternary-material groundwater from Wells 4586, 4786, 5086, 46192, B111189, and B410589. Americium-241 was detected at activities above sitewide background values in quaternary-material groundwater from Well 5086. Plutonium-239/240 was detected at activities above sitewide background values in quaternary-material groundwater from Well 5086.

Additional results of activities of strontium-89/90, cesium-137, radium-226, and radium-228 did not lead to any significant changes in the interpretation of the distribution of activities for these species (see Figure 3-4). Strontium-89/90, cesium-137, and radium-226 were not detected at activities above sitewide background values. Radium-228 was detected at activities above sitewide background values in quaternary-material groundwater from Wells 4786 and 5186.

Additional results of inorganic water-quality parameters did not change interpretations of these analyte distributions.

Additional results of VOAs indicate that carbon tetrachloride was detected at 5 μg/l in fourth-quarter groundwater from Well 5186. Toluene was detected in fourth-quarter groundwater from Well 4886 at a concentration of 6 μg/l. Total xylenes were detected at 10 μg/l in Well B110889. Concentrations of the these analytes in these wells were below detection limits for the first three quarters of the year. Results of VOAs and their laboratory qualifiers are presented in Figure 3-5. Results qualified as "U" (not detected) or "J" (value is estimated - spectral identification criteria are met, but the value is below contract-required quantitation limits) are not listed in Figure 3-5. Concentrations of analytes that are common laboratory contaminants and that were also detected in laboratory method blanks (i.e. methylene chloride and acetone) are also not listed in Figures 3-5, except where common laboratory contaminants are also detected in other quarters and not qualified with a "B." (A "B" laboratory qualifier indicates that the analyte was also detected in the laboratory method blank.)

3.4 Conclusions

Results of analyses and statistical comparisons of results indicate that operations at the West Spray Field may have contributed tritium, radium-228, americium-241, and plutonium-239/240, selected dissolved metals (calcium, sodium, and vanadium), and selected inorganic analytes (nitrate/nitrite, chloride, fluoride, and silicon) to the groundwater. Because the three VOCs detected in fourth-quarter samples were detected only in fourth-quarter samples, they are considered infrequently detected analytes and may not represent actual groundwater contamination.

4.0 PRESENT LANDFILL

4.1 Infrequently Detected Analytes

Table 9 (also see Appendix B of this addendum) lists infrequently detected analytes in upgradient and downgradient wells for the Present Landfill RCRA Unit. Analytes were classified as infrequently detected if they were detected in fewer than 50 percent of the samples for any given well, or if there were fewer than two reported analytical results for the year in any given well. Table 9 also lists the concentrations of these infrequently detected analytes.

Only one additional analyte not listed on Table 4-5 of the 1992 Report was added to the infrequently detected list. Orthophosphate was detected in water sampled from Well B207089 on 4/28/92.

Additional analytical results for gross alpha (suspended), radium-226, bicarbonate (as $CaCO_3$), chloride, soluble fluoride, sulfate, total dissolved solids, and total suspended solids concentrations moved these analytes from the "infrequently detected" category to the "analytes with greater than 50-percent detection" category.

4.2 ANOVA Comparisons

Table 10 lists analytes that were detected in any given upgradient or downgradient well with greater than 50-percent frequency. Data-type distribution (i.e., normal, log normal, or non-parametric) and probabilities of differences in analyte concentrations being statistically significant are also presented. Nickel is the only additional analyte having a statistically significant difference between the upgradient well POOL and downgradient wells, or between individual downgradient wells. Results of recalculation of ANOVA tests using the updated data bases of chemical concentrations indicate that no statistically significant differences between the upgradient well POOL and downgradient wells or between individual downgradient wells exist for chromium.

4.3 Groundwater Quality

Additional data for radioactive species were primarily results of analyses of fourth-quarter samples. Additional data led to no significant changes in the interpretation of the distribution of gross alpha or gross beta activities for groundwater in either quaternary material or weathered bedrock. Figures 4-1 and 4-2 present gross alpha and gross beta activities for groundwater in quaternary material and weathered bedrock, respectively. No reported gross alpha or gross beta activities exceeded sitewide background values. Results of radioactivity analyses qualified by the laboratory with a "U" (compound was analyzed for, but not detected), "B" (reported value is less than the contract-required detection limit, but greater than the instrument detection limit), or "J" (reported value is greater than the instrument detection limit, but control sample analysis is not within control limits - value is estimated) are listed as "BDL" (below detection limits) in the figures.

Additional results of activities of uranium-233/234, uranium-235, and uranium-238 did not lead to any significant changes in the interpretation of the distribution of activities for these species (see Figures 4-3 and 4-4). No reported activities of uranium-233/234, uranium-235, or uranium-238 were detected above sitewide background values in groundwater in quaternary material or weathered bedrock.

Additional results of activities of tritium, americium-241, and plutonium-239/240 did not lead to any significant changes in the interpretation of the distribution of activities for these species (see Figures 4-5 and 4-6). Tritium was detected at activities above sitewide background values in quaternary-material groundwater from Wells 6387, 6487, and 6587. Tritium was not detected at activities above sitewide background values in weathered-bedrock groundwater. Americium-241 was detected at activities above sitewide background values in quaternary-material groundwater from Well 6387. Americium-241 was not detected at activities above sitewide background values in weathered-bedrock groundwater. Plutonium-239/240 was detected at activities above sitewide background values in quaternary-material groundwater from Wells 6387 and 6587. Plutonium-239/240 was not detected at activities above sitewide background values in weathered-bedrock groundwater.

Additional results of activities of strontium-89/90, cesium-137, radium-226, and radium-228 did not lead to any significant changes in the interpretation of the distribution of activities for these species (see Figures 4-7 and 4-8). Strontium-89/90 was detected at activities above sitewide background values in quaternary-material groundwater from Wells 1086 and 6087. Strontium-89/90 was not detected at activities above sitewide background values in weathered-bedrock groundwater. Cesium-137 was not detected at activities above sitewide background values in quaternary-material groundwater or weathered-bedrock groundwater. Radium-226 was detected at activities above sitewide background values in quaternary-material groundwater from Wells 6487 and B206389, and in weathered-bedrock groundwater from Wells B206589 and B207089. Radium-228 was detected at activities above sitewide background values in quaternary-material groundwater from Well 6487. Radium-228 was not detected at activities above sitewide background values in weathered-bedrock groundwater.

Additional results of inorganic water-quality parameters did not change interpretations of these analyte distributions.

Additional results of VOAs indicate that in second-quarter groundwater, vinyl chloride was detected at 10 μg/l in Well 6387; toluene was detected at 5 μg/l in Well 6487; 1,1,1-trichloroethane was detected at 5 μg/l in Wells B206389 and B206489; and 1,2-dichloroethane

was detected at 5 μg/l in Well B206489. Also, 1,2-dichloroethene was detected in fourth-quarter groundwater from Well 7287 at a concentration of 5 μg/l. Figures 4-9 and 4-10 list concentrations of detected VOCs in quaternary-material groundwater and weathered-bedrock groundwater (respectively), and include laboratory qualifiers. Results qualified as "U" (not detected) or "J" (value is estimated - spectral identification criteria are met, but the value is below contract-required quantitation limits) are not listed in Figure 4-10. Concentrations of analytes that are common laboratory contaminants and that were also detected in laboratory method blanks (i.e., methylene chloride) are also not listed in Figures 4-10, except where common laboratory contaminants are also detected in other quarters and not qualified with a "B." (A "B" laboratory qualifier indicates that the analyte was also detected in the laboratory method blank.)

4.4 Conclusions

Results of additional analyses support the original conclusions made in the 1992 Report. Analysis of the occurrence and distribution of analytes throughout the landfill area indicates that the landfill is impacting groundwater by the addition of VOCs, radionuclides, dissolved metals, and major inorganic ions typical of landfill leachate, including bicarbonate, calcium, chloride, magnesium, nitrate/nitrite, sodium, sulfate, and total dissolved solids. Although the groundwater-interceptor system appears to be effective in limiting the transport of leachate-related constituents, some radionuclides, metals, and other inorganic analytes occur both inside and outside of the groundwater-interceptor system at concentrations exceeding background levels. No VOCs were detected in any downgradient monitoring wells east of the East Landfill Pond embankment. The occurrence of VOCs, radionuclides, metals, and inorganic analytes in groundwater to the south and southeast of the Present Landfill (IHSS 114) may be due to (1) impacts from IHSSs 166.1, 166.2, and/or 166.3, (2) inadequate functioning of the groundwater-interceptor system at the south edge of the landfill, or (3) impacts from landfilled wastes emplaced beyond the limit of the interceptor system.

Table 1
Percent Completeness/Percent Validated

Analytical Group	Number of Samples Taken[1]	Number of Results Returned[2]	Number of Validations Received[3]	Percent Completeness[4]	Percent Validated[5]
Volatiles	467	466	374	99%	80%
Semi-volatiles	5	5	5	100%	100%
Radio-nuclides	411	411	330	100%	80%
Metals[6]	336	336	282	100%	84%
Pesticides/ PCBs	5	5	5	100%	100%
Water-Quality Parameters	457	457	457	100%	100%
Total	**1,681**	**1,680**	**1,453**	**99%**	**86%**

[1] Number of samples sent to laboratory.

[2] Number of analytical results received from laboratory, not including laboratory QA/QC analyses.

[3] Number of samples that have undergone the validation process, not the number of valid samples.

[4] Percent completeness = (number of analytical results received/number of samples sent to lab) x 100.

[5] Percent validated = (number of validations performed/number of analytical results received) x 100.

[6] Dissolved metals only. Does not include total metals.

Table 2
Results of Validation

Analytical Group	Number of Individual Analyte Results	Number and % of Results Deemed "Valid"	Number and % of Results Deemed "Acceptable"	Number and % of Results Deemed "Acceptable With Qualifiers"	Number and % of Results Deemed "Valid", "Acceptable", or "Acceptable With Qualifiers"
Volatile Organic Compounds	13,024	9,529 (73%)	150 (1%)	215 (2%)	9,894 (76%)
Radio-nuclides	3,027	390 (13%)	1,805 (60%)	34 (1%)	2,229 (74%)
Metals	8,048	5,021 (62%)	0 (0%)	1,550 (19%)	6,571 (82%)
Water-Quality Parameters	3,850	3,399 (88%)	0 (0%)	283 (7%)	3,682 (96%)
TOTALS	**27,949**	**18,339 (66%)**	**1,955 (7%)**	**2,082 (7%)**	**22,376 (80%)**

Table 3

Infrequently Detected Analytes in 1992 Quaternary-Material Groundwater From Upgradient or Downgradient Monitoring Wells Near the Solar Evaporation Ponds (Analytes with Fewer than 50% Quantified Results)

Well ID	Sampling Date	Analyte	Concentration	Units	Error	Lab Qualifier[1]
P209789	10/16/92	1,1,1-Trichloroethane	11	µg/l	-	B
2686	10/12/92	Acetone	20	µg/l	-	B
P209789	10/16/92	Acetone	12	µg/l	-	B
P207689	10/09/92	Methylene Chloride	14	µg/l	-	B
P209789	10/16/92	Methylene Chloride	16	µg/l	-	B
P209789	10/16/92	Toluene	8	µg/l	-	-
3887	04/21/92	Bicarbonate (as $CaCO_3$)	680.00	mg/l	-	-
P207689	01/15/92	Carbonate (as $CaCO_3$)	32.00	mg/l	-	-
P209789	01/20/92	Carbonate (as $CaCO_3$)	2.00	mg/l	-	-
3887	04/21/92	Chloride	88.00	mg/l	-	-
3787	04/14/92	Cyanide	0.13	mg/l	-	-
3887	04/21/92	Fluoride	2.70	mg/l	-	-
3787	04/14/92	Orthophoshate	0.03	mg/l	-	-
2686	04/14/92	Orthophosphate	0.02	mg/l	-	-
2686	01/30/92	Silica (dissolved)	8.00	mg/l	-	-
2886	01/28/92	Silica (dissolved)	4.50	mg/l	-	-
3787	02/27/92	Silica (dissolved)	6.00	mg/l	-	-
P207689	01/15/92	Silica (dissolved)	7.30	mg/l	-	-
P207889	01/22/92	Silica (dissolved)	4.10	mg/l	-	-
P209789	01/20/92	Silica (dissolved)	4.70	mg/l	-	-
3887	04/21/92	Sulfate	360.00	mg/l	-	-
3887	04/21/92	Total Dissolved Solids	1,600.00	mg/l	-	-

Table 3
Infrequently Detected Analytes in 1992 Quaternary-Material Groundwater From Upgradient or Downgradient Monitoring Wells Near the Solar Evaporation Ponds (Analytes with Fewer than 50% Quantified Results)

Well ID	Sampling Date	Analyte	Concentration	Units	Error	Lab Qualifier[1]
P207689	10/09/92	Total Solids	65.50	mg/l	-	-
P209789	10/16/92	Total Solids	54.50	mg/l	-	-
2686	01/30/92	Total Suspended Solids	15.00	mg/l	-	-
2686	04/14/92	Total Suspended Solids	8.00	mg/l	-	-
3887	04/21/92	Total Suspended Solids	220.00	mg/l	-	-
P207689	04/15/92	Cadmium	49.10	µg/l	-	-
2886	07/21/92	Mercury	0.28	µg/l	-	-
2686	04/14/92	Americium-241 (total)	0.003	pCi/l	0.003	J
2686	01/28/92	Radium-226	0.812	pCi/l	0.088	-
2686	04/14/92	Radium-226	0.127	pCi/l	0.199	J
P207889	04/08/92	Radium-226	0.128	pCi/l	0.079	J
P209789	10/16/92	Radium-226	0.460	pCi/l	0.165	-
P207889	04/08/92	Strontium-89, 90	0.708	pCi/l	0.433	J
3787	04/14/92	Tritium	529.600	pCi/l	257.000	-
2686	04/14/92	Uranium-233, 234	29.930	pCi/l	4.360	-
2686	04/14/92	Uranium-235	0.538	pCi/l	0.323	J

[1] B = organics: analyte also detected in laboratory method blank
J = reported value is greater than the instrument detection limit, but control sample analyses are not within control limits - value is estimated

Table 4
Infrequently Detected Analytes in 1992 Bedrock Groundwater From Upgradient or Downgradient Monitoring Wells Near the Solar Evaporation Ponds (Analytes with Fewer than 50% Quantified Results)

Well ID	Sampling Date	Analyte	Concentration	Units	Error	Lab Qualifier
3086	10/09/92	Methylene Chloride	12	µg/l	-	-
P207989	10/08/92	Methylene Chloride	7	µg/l	-	-
P208989	10/09/92	Methylene Chloride	37	µg/l	-	-
3086	01/29/92	Silica (dissolved)	6.7	mg/l	-	-
P207989	03/06/92	Silica (dissolved)	6.0	mg/l	-	-
P208989	01/30/92	Silica (dissolved)	8.7	mg/l	-	-
P209489	01/30/92	Silica (dissolved)	7.0	mg/l	-	-
3086	10/09/92	Total Solids	112.0	mg/l	-	-
P207989	10/08/92	Total Solids	12.5	mg/l	-	-
P208989	10/09/92	Total Solids	11.0	mg/l	-	-
P209489	10/15/92	Total Solids	44.8	mg/l	-	-
P209589	04/10/92	Total Suspended Solids	830.0	mg/l	-	-
3086	10/09/92	Chromium	3.30	µg/l	-	-
P208989	10/09/92	Chromium	22.00	µg/l	-	-
3086	01/29/92	Mercury	0.31	µg/l	-	-
P208989	01/30/92	Mercury	0.26	µg/l	-	-
P209489	01/30/92	Mercury	0.34	µg/l	-	-
P209489	04/24/92	Mercury	0.25	µg/l	-	-
P207989	03/06/92	Gross Alpha	51.09	pCi/l	13.50	-
P207989	03/06/92	Gross Beta	26.11	pCi/l	4.98	-
P209589	07/09/92	Tritium	12,700.00	pCi/l	1,090.00	-
3086	10/09/92	Tritium (total)	2,700.00	pCi/l	260.00	-
P209489	10/15/92	Tritium (total)	1,300.00	pCi/l	316.70	-

Table 5

ANOVA Statistical Comparisons of Chemical Concentrations in 1992 Quaternary-Material Groundwater From Upgradient and Downgradient Monitoring Wells Near the Solar Evaporation Ponds (Analytes with More than 50% Quantified Results)

Analyte[1]	ANOVA Method Used[2]	Probability Value (P)	Conclusion If P < 0.05[3]	Wells Compared Using ANOVA Methods[4]
Tetrachloroethene	NP	0.0805		P209789, POOL
Trichloroethene	NP	0.5205		2686, POOL
Aluminum	NP	0.5016		2686, 2886, P207689, P207889, P209789, POOL
Barium	NP	0.0549		2686, 2886, P207689, P207889, P209789, POOL
Calcium	NP	0.5509		2686, 2886, P207689, P207889, P209789, POOL
Cobalt	LN	0.4433		2886, POOL
Iron	NP	0.211		2886, P207689, P207889, P209789, POOL
Lithium	NP	0.0066	#	2886 > 2686 > P207689 > P209789 > P207889 > POOL (19.0 > 16.0 > 10.0 > 8.7 > 3.5 > 1.0)
Magnesium	NP	0.0311	#	2686 = P207689 > P207889 > 2886 > P209789 > POOL (15.5 = 15.5 > 10.0 > 9.7 > 5.0 > 2.0)
Manganese	N	0.3689		2886, POOL
Molybdenum	NP	0.2765		2686, 2886, POOL
Nickel	N	0.3766		2886, POOL
Potassium	NP	0.0133	#	2886 > P207689 > P209789 > 2686 > POOL > P207889 (19.0 > 13.6 > 9.2 > 8.3 > 7.0 > 2.3)
Selenium	NP	0.0076	#	P207889 > P207689 > 2686 > P209789 > 2886 > POOL (16.3 > 14.6 > 14.3 > 7.0 > 3.0 > 1.0)
Silicon	NP	0.0163	#	2686 > P207689 > P209789 > 2886 > P207889 (13.0 > 11.3 > 6.3 > 3.5 > 2.0)
Sodium	NP	0.0093	#	2886 > 2686 > P207889 > 207689 > 209789 > POOL (18.0 > 15.7 > 12.0 > 10.0 > 4.4 > 1.0)
Strontium	NP	0.0406	#	P207689 > 2686 > 2886 > P207889 > P209789 > POOL (16.4 > 14.0 > 9.3 > 9.0 > 5.8 > 2.0)

Table 5

ANOVA Statistical Comparisons of Chemical Concentrations in 1992 Quaternary-Material Groundwater From Upgradient and Downgradient Monitoring Wells Near the Solar Evaporation Ponds (Analytes with More than 50% Quantified Results)

Analyte[1]	ANOVA Method Used[2]	Probability Value (P)	Conclusion If $P < 0.05$[3]	Wells Compared Using ANOVA Methods[4]
Vanadium	NP	0.3359		2686, 2886, P207689, P207889, P209789, POOL
Zinc	LN	0.0639		2686, 2886, P207689, P207889, P209789, POOL
Bicarbonate (as $CaCO_3$)	NP	0.0007	#	2686 > 3787 > 2886 > P207689 > P207889 > POOL > P209789 (27.6 > 21.0 > 19.7 > 19.4 > 9.0 > 7.7 > 7.1)
Carbonate (as $CaCO_3$)	NP	0.3173		3787, POOL
Chloride	NP	0.1383		P207889 > P207689 > 2886 > 2686 > 3787 > POOL > P209789
Cyanide	LN	0.8433		2886, P207689, P207889, POOL
Fluoride	LN	0.0001	*	2886, 2886, 3787, P207689, P207889, P209789, Pool 26896, 3787, P207689, P207889, P209789 > Pool
Nitrate/Nitrite	LN	0.0184	*	2886, 3887, 3787, P207689, P209789, 2686, P207889, POOL 2886 > POOL
Orthophosphate	NP	0.1573		2886, POOL
Sulfate	NP	0.0013	#	P207889 > 2686 > P207689 > 3787 > 2886 > POOL > P209789 (28.3 > 23.6 > 17.8 > 17.3 > 15.0 > 8.2 > 5.8)
Total Dissolved Solids	NP	0.0007	#	2886 > 2686 > P207689 > P207889 > 3787 > P209789 > POOL (25.3 > 25.0 > 20.2 > 15.0 > 13.7 > 10.3 > 3.0)
Total Suspended Solids	NP	0.0196	#	P207689 > 3787 > P209789 > 2886 > P207889 > POOL (17.5 > 17.3 > 14.9 > 11.0 > 9.3 > 3.7)
Cesium - 137	N	0.7473		2886, P207689, P209789 (NO POOL)
Gross Alpha	NP	0.0204	#	2686 > 2886 > P207689 > P207889 > POOL > P209789 (20.0 > 15.3 > 13.6 > 13.3 > 7.0 > 3.5)
Gross Beta	NP	0.0014	#	2686 > 2886 > P207689 > P207889 > P209789 > POOL (22.0 > 21.3 > 16.4 > 11.8 > 5.6 > 3.3)
Strontium - 89, 90	N	0.5729		2886, P207689, P209789
Tritium	N	0.1698		2886, P207689, P207889, POOL

Table 5

ANOVA Statistical Comparisons of Chemical Concentrations in 1992 Quaternary-Material Groundwater From Upgradient and Downgradient Monitoring Wells Near the Solar Evaporation Ponds (Analytes with More than 50% Quantified Results)

Analyte[1]	ANOVA Method Used[2]	Probability Value (P)	Conclusion If P < 0.05[3]	Wells Compared Using ANOVA Methods[4]
Uranium - 233, 234	NP	0.0958		2886, P207689, P207889, P209789, POOL
Uranium - 235	NP	0.0828		2886, P207689, P207889, P209789, POOL
Uranium - 238	NP	0.1462		2686, 2886, P207689, P207889, P209789, POOL
Americium - 241 (total)	NP	0.0395	#	P207889 > P209789 > 2886 > P207689 (NO POOL) (12.3 > 10.0 > 7.0 > 3.8)
Plutonium - 239, 240 (total)	NP	0.4597		2886, P207689, P207889, P209789 (NO POOL)
Tritium (total)	NP	0.236		2686, 2886, 3787, P209789, POOL

[1] Metals are dissolved metals, unless otherwise stated.

Radionuclides are dissolved radionuclides, unless otherwise stated.

[2] N = ANOVA method for normally distributed data
LN = ANOVA method for lognormally distributed data
NP = ANOVA method for non-parametric (undistributed) data

[3] * Indicates that the analyte concentrations in the downgradient wells listed are statistically greater than the analyte concentrations in the upgradient POOL wells. This may indicate downgradient contamination.

** Indicates that the analyte concentrations in the upgradient POOL wells are statistically greater than the analyte concentrations in the downgradient wells listed. This may indicate a possible upgradient source.

# Indicates a statistically significant difference between some wells within the data set. The statistical method does not identify the locations that differ statistically. Contaminant distribution must be evaluated to determine if downgradient contamination is present.

[4] If P < 0.05, wells are compared using their simultaneous upper confidence limit (for normally and lognormally distributed data) or mean score (for non-parametric data). For non-parametric data, mean scores are also presented for each well, respectively.

POOL consists of Wells 2486, P207489, and P209289.

Table 6

ANOVA Statistical Comparisons of Chemical Concentrations in 1992 Bedrock Groundwater From Upgradient and Downgradient Monitoring Wells Near the Solar Evaporation Ponds (Analytes with More than 50% Quantified Results)

Analyte[1]	ANOVA Method Used[2]	Probability Value (P)	Conclusion If P < 0.05[3]	Wells Compared Using ANOVA Tests[4]
1,2-Dichloroethene	NP	0.0012	#	P209489 > POOL (10.5 > 4.5)
Acetone	NP	0.4184		P207589 > 3086 > P209689 > POOL
Benzene	NP	0.1921		P209689, POOL
Carbon Disulfide	NP	0.1314		P207589, P207689, POOL
Carbon Tetrachloride	NP	0.044	#	P209489 > POOL (9.3 > 5.0)
Chloroform	NP	0.003	#	P209489 > POOL > P209689 (13.5 > 6.2 > 2.8)
Methylene Chloride	NP	0.1988		P209689, POOL
Tetrachloroethene	NP	0.4405		3086, P209489, POOL
Toluene	NP	0.0935		P209689, POOL
Total Xylenes	NP	0.0935		P209689, POOL
Trichloroethene	NP	0.0014	#	P209489 > POOL (11.5 > 4.5)
Aluminum	LN	0.0044	*	3086, P208989, P209489, POOL P208989 > POOL
Barium	NP	0.0001	#	P208989 > POOL > P209489 > 3086 (22.0 > 15.0 > 8.0 > 3.0)
Calcium	NP	0.0001	#	P208989 > 3086 > P209489 > POOL (22.0 > 17.0 > 12.0 > 5.0)
Iron	NP	0.5565		3086, P209489, POOL
Lithium	NP	0.0002	#	3086 > P208989 > P209489 > POOL (21.0 > 18.0 > 11.8 > 5.1)

Table 6
ANOVA Statistical Comparisons of Chemical Concentrations in 1992 Bedrock Groundwater From Upgradient and Downgradient Monitoring Wells Near the Solar Evaporation Ponds (Analytes with More than 50% Quantified Results)

Analyte[1]	ANOVA Method Used[2]	Probability Value (P)	Conclusion If P < 0.05[3]	Wells Compared Using ANOVA Tests[4]
Magnesium	NP	0.0001	#	P208989 > 3086 > P209489 > POOL (21.0 > 18.0 > 12.0 > 5.0)
Manganese	NP	0.0006	#	P209489 > P208989 > 3086 > POOL (22.0 > 16.0 > 10.2 > 6.6)
Nickel	NP	0.173		3086, P209489, POOL
Potassium	NP	0.0001	#	P209489 > 3086 > P208989 > POOL (22.0 > 17.0 > 12.0 > 5.0)
Selenium	NP	0.0013	#	P208989 > 3086 > POOL (17.0 > 10.8 > 5.7)
Silicon	NP	0.0171	#	P208989 > POOL > 3086 > P209489 (17.5 > 9.2 > 8.4 > 5.5)
Sodium	NP	0.0001	#	3086 > P208989 > P209489 > POOL (22.0 > 17.0 > 12.0 > 5.0)
Strontium	NP	0.0001	#	P208989 > 3086 > P209489 > POOL (22.0 > 17.0 > 11.8 > 5.1)
Vanadium	LN	0.0254	*	3086, P208989, P209489, POOL P208989 > POOL
Zinc	NP	0.4345		3086, P208989, P209489, POOL
Bicarbonate (as $CaCO_3$)	NP	0.0089	#	3086 > P209489 > P207989 > P208989 > POOL > P209589 (25.4 > 23.2 > 19.2 > 12.5 > 11.2 > 7.0)
Carbonate	NP	0.8290		3086, POOL
Carbonate (as $CaCO_3$)	NP	0.0943		P207989, POOL
Chloride	NP	0.0001	#	P209589 > P207989 > P208989 > 3086 > P209489 > POOL (28.0 > 23.7 > 21.1 > 18.1 > 12.5 > 5.5)
Fluoride	NP	0.0162	#	P207989 > 3086 > P208989 > POOL > P209589 > P209489 (23.5 > 20.5 > 11.5 > 9.5 > 8.8 > 7.9)

Table 6

ANOVA Statistical Comparisons of Chemical Concentrations in 1992 Bedrock Groundwater From Upgradient and Downgradient Monitoring Wells Near the Solar Evaporation Ponds (Analytes with More than 50% Quantified Results)

Analyte[1]	ANOVA Method Used[2]	Probability Value (P)	Conclusion If P < 0.05[3]	Wells Compared Using ANOVA Tests[4]
Nitrate/Nitrite	NP	0.0004	#	P209589 > P208989 > 3086 > P209489 > POOL > P207989 (24.0 > 21.8 > 17.5 > 13.5 > 7.5 > 2.0)
Orthophosphate	NP	0.2886		3086, POOL
Sulfate	NP	0.0004	#	P209589 > P207989 > 3086 > P208989 > P209489 > POOL (29.3 > 27.7 > 22.3 > 15.5 > 10.3 > 8.5)
Total Dissolved Solids	NP	0.0001	#	P209589 > P208989 > 3086 > P209489 > P207989 > POOL (30.0 > 26.0 > 21.0 > 16.0 > 12.0 > 5.5)
Total Suspended Solids	NP	0.0011	#	3086 > P209489 > P208989 > P207989 > POOL (21.5 > 15.9 > 14.6 > 8.0 > 5.8)
Cesium - 137	N	0.3794		P208989, P209489, POOL
Gross Alpha	NP	0.0002	#	3086, P208989 > P209489 > POOL (21.5 > 18.0 > 14.0 > 6.0)
Gross Beta	NP	0.0002	#	3086 > P209489 > P208989 > POOL (21.0 > 19.3 > 16.0 > 6.0)
Radium - 226	NP	0.0597		3086, P208989, P209489, POOL
Radium - 228	NP	0.2207		P208989, POOL
Strontium - 89, 90	NP	0.4183		3086, P208989, P209489, POOL
Total Radiocesium	N	0.0441	**	P208989, POOL POOL > P208989
Tritium	NP	0.0156	#	3086 > P208989 > P209489 > POOL (11.5 = 11.5 > 8.0 > 3.5)
Uranium - 233, 234	NP	0.0006	#	3086 > P208989 > P207989 > P209489 > POOL (20.8 > 19.0 > 13.5 > 12.8 > 5.0)
Uranium - 235	NP	0.0005	#	3086 > P208989 > P209489 > P207989 > POOL (22.0 > 19.0 > 14.4 > 14.0 > 5.5)

Table 6

ANOVA Statistical Comparisons of Chemical Concentrations in 1992 Bedrock Groundwater From Upgradient and Downgradient Monitoring Wells Near the Solar Evaporation Ponds (Analytes with More than 50% Quantified Results)

Analyte[1]	ANOVA Method Used[2]	Probability Value (P)	Conclusion If P < 0.05[3]	Wells Compared Using ANOVA Tests[4]
Uranium - 238	NP	0.0004	#	3086 > P208989 > P209489 > P207989 > POOL (21.8 > 20.0 > 14.2 > 13.5 > 5.5)
Americium - 241 (total)	NP	0.2584		3086, P208989, P209489, POOL
Plutonium - 239, 240 (total)	NP	0.2407		3086, P208989, P209489, POOL
Tritium (total)	NP	0.0407	#	P208989 > POOL > P207989 (7.0 > 4.0 > 1.5)

[1] Metals are dissolved metals, unless otherwise stated.

Radionuclides are dissolved radionuclides, unless otherwise stated.

[2] N = ANOVA method for normally distributed data
LN = ANOVA method for lognormally distributed data
NP = ANOVA method for non-parametric (undistributed) data

[3] • Indicates that the analyte concentrations in the downgradient wells listed are statistically greater than the analyte concentrations in the upgradient POOL wells. This may indicate downgradient contamination.

** Indicates that the analyte concentrations in the upgradient POOL wells are statistically greater than the analyte concentrations in the downgradient wells listed. This may indicate a possible upgradient source.

# Indicates a statistically significant difference between some wells within the data set. The statistical method does not identify the locations that differ statistically. Contaminant distribution must be evaluated to determine if downgradient contamination is present.

[4] If P < 0.05, wells are compared using their simultaneous upper confidence limit (for normally and lognormally distributed data) or mean score (for non-parametric data). For non-parametric data, mean scores are also presented for each well, respectively.

POOL consists of Wells P207389 and P209389.

Table 7
Infrequently Detected Analytes in 1992 Groundwater From Upgradient or Downgradient Monitoring Wells at the West Spray Field (Analytes with Fewer than 50% Quantified Results)

Well ID	Sampling Date	Analyte	Concentration	Units	Lab Qualifier[1]
B410689	10/08/92	Methylene Chloride	19	µg/l	B
B110889	10/09/92	Xylenes (total)	10	µg/l	-
B410589 (duplicate)	07/29/92	Carbonate	2.00	mg/l	-
B110889	03/12/92	Carbonate (as$CaCO_3$)	2.00	mg/l	-
B410689	04/28/92	Carbonate (as$CaCO_3$)	4.00	mg/l	-
B410789	04/28/92	Carbonate (as$CaCO_3$)	2.00	mg/l	-
5086	07/14/92	Orthophosphate	0.02	mg/l	-
B110989	01/29/92	Orthophosphate	0.02	mg/l	-
B110989	04/29/92	Orthophosphate	0.02	mg/l	-
B410689	04/28/92	Orthophosphate	0.02	mg/l	-
5086	02/11/92	Silica (dissolved)	12.00	mg/l	-
B110989	01/29/92	Silica (dissolved)	12.00	mg/l	-
B410589	02/12/92	Silica (dissolved)	8.90	mg/l	-
B410689	01/27/92	Silica (dissolved)	11.00	mg/l	-
B410789	01/31/92	Silica (dissolved)	10.00	mg/l	-
B410589	10/07/92	Total Solids	115.00	mg/l	-
B410689	10/08/92	Total Solids	41.40	mg/l	-
B410789	10/07/92	Total Solids	66.00	mg/l	-
B110889	03/12/92	Total Suspended Solids	18.00	mg/l	-
B410589	10/07/92	Antimony	25.50	µg/l	-
B410689	10/08/92	Arsenic	0.80	µg/l	-
B410689	10/08/92	Beryllium	1.10	µg/l	-
B410589	10/07/92	Copper	18.90	µg/l	-
B110889	10/09/92	Lead	1.50	µg/l	-
B110889	01/31/92	Mercury	0.21	µg/l	-
B110989	01/29/92	Mercury	0.21	µg/l	-
B111189	01/31/92	Mercury	0.21	µg/l	-
B410789	01/31/92	Mercury	0.21	µg/l	-

[1] B = analyte also detected in the laboratory method blank

Table 8
ANOVA Statistical Comparisons of Chemical Concentrations in 1992 Groundwater From Upgradient and Downgradient Monitoring Wells at the West Spray Field (Analytes with More than 50% Quantified Results)

Analyte[1]	ANOVA Method Used[2]	Probability Value (P)	Conclusion If $P < 0.05$[3]	Wells Compared Using ANOVA Methods[4]
Methylene Chloride	NP	0.7982		B110889, B410589, B410789, POOL
Aluminum	NP	0.2677		5086, B110889, B110989, B111189, B410589, B410689, B410789, POOL
Barium	NP	0.0046	#	B410789 > 5086 > B110889 > B410589 > POOL > B110989 > B111189 > B410689 (40.2 > 32.9 > 27.1 > 26.3 > 24.6 > 20.0 > 11.3 > 10.0)
Calcium	NP	0.0001	#	B410789 > B410589 > 5086 > B410689 > B110889 > B110989 > POOL > B111189 (45.0 > 39.5 > 33.1 > 26.8 > 25.0 > 17.3 > 10.6 > 3.0)
Chromium	NP	0.9125		B410589, POOL
Iron	NP	0.2876		5086, B110889, B110989, B111189, B410589, B410689, B410789, POOL
Lithium	NP	0.0875		5086, B410789, B110989, POOL, B110889, B111189, B410689, B410589
Magnesium	NP	0.0001	#	B410589 > B410789 > B110889 > B410689 > 5086 > B110989 > POOL > B111189 (44.5 > 39.0 > 33.0 > 27.2 > 23.0 > 13.3 > 10.7 > 5.7)
Manganese	NP	0.2583		B111189, B410589, POOL
Molybdenum	NP	0.6153		B410589, B410689, POOL
Potassium	NP	0.1076		5086, POOL, B410789, B110989, B110889, B410689, B410589, B111189
Silicon	NP	0.0003	#	5086 > B110989 > B111189 > B410789 > POOL > B110889 > B410689 > B410589 (34.1 > 30.5 > 27.5 > 23.4 > 17.3 > 16.6 > 12.4 > 3.0)
Sodium	NP	0.0001	#	B110989 > B111189 > B110889 > B410789 > B410589 > B410689 > 5086 > POOL (41.5 > 37.4 > 35.1 > 31.9 > 23.1 > 19.8 > 13.5 > 8.1)
Strontium	NP	0.0001	#	B410789 > B410589 > B110889 > 5086 > B410689 > B110989 > POOL > B111189 (42.4 > 41.3 > 29.2 > 28.6 > 21.7 > 17.4 > 10.7 > 8.7)
Vanadium	NP	0.0194	#	5086 > B410589 > B110989 > B410689 > B410789 > B110889 > POOL (34.9 > 28.8 > 21.4 > 20.3 > 19.3 > 13.8 > 13.5)
Zinc	NP	0.0841		5086, B110889, B110989, B111189, B410589, B410689, B410789, Pool

Table 8
ANOVA Statistical Comparisons of Chemical Concentrations in 1992 Groundwater From Upgradient and Downgradient Monitoring Wells at the West Spray Field (Analytes with More than 50% Quantified Results)

Analyte[1]	ANOVA Method Used[2]	Probability Value (P)	Conclusion If $P < 0.05$[3]	Wells Compared Using ANOVA Methods[4]
Bicarbonate (as $CaCO_3$)	NP	0.0001	#	B410589 > B410789 > 5086 > B410689 > B110889 > B110989 > B111189 > POOL (48.4 > 42.0 > 34.3 > 27.8 > 27.3 > 19.8 > 10.5 > 9.3)
Chloride	NP	0.0001	#	B410789 > B410589 > 5086 > B410689 > B110889 > B110989 > B111189 > POOL (42.0 > 35.3 > 31.0 > 23.4 > 20.3 > 15.5 > 9.1 > 6.1)
Fluoride	NP	0.0007	#	B410589 > B410689 > B110889 > B410789 > B111189 > B110989 > 5086 > POOL (37.0 > 31.2 > 25.6 > 20.5 > 16.4 > 12.1 > 11.8 > 11.4)
Fluoride, Soluble	LN	0.1806		5086, POOL
Nitrate/Nitrite	NP	0.0031	#	B410789 > B410689 > POOL > B110889 > 5086 > B410589 > B110989 > B111189 (31.6 > 27.0 > 26.1 > 23.0 > 15.7 > 15.0 > 12.4 > 5.0)
Nitrate/Nitrite (Historical C)	NP	0.5637		5086, POOL
Orthophosphate	NP	0.1282		B110889, B111189, POOL
Silica - Dissolved	NP	0.1905		B110889, B111189, POOL
Sulfate	NP	0.0001	#	POOL > B410789 > B410589 > B410689 > B110889 > 5086 > B111189 > B110989 (45.1 > 41.0 > 31.0 > 22.7 > 19.4 > 18.8 > 12.5 > 5.0)
Total Dissolved Solids	NP	0.0001	#	B410789 > B410589 > B410689 > 5086 > POOL > B110889 > B110989 > B111189 (44.2 > 40.8 > 34.9 > 27.1 > 24.7 > 19.0 > 13.6 > 5.3)
Total Suspended Solids	LN	0.1264		5086, B110989, B111189, B410589, B410689, B410789, POOL
Cesium - 137	NP	0.8718		5086, B110889, B110989, B111189, B410589, B410689, B410789, POOL
Gross Alpha	NP	0.0004	#	B410789 > B410589 > B110889 > B410689 > POOL > B111189 > 5086 > B110989 (45.5 > 40.3 > 32.4 > 29.6 > 21.7 > 15.7 > 11.4 > 11.0)
Gross Beta	NP	0.0129	#	B410789 > POOL > B111189 > B110889 > B410589 > 5086 > B410689 > 110989 (40.5 > 38.1 > 29.9 > 29.0 > 23.9 > 22.6 > 21.3 > 7.8)
Strontium - 89, 90	NP	0.9509		5086, B110889, B110989, B111189, B410589, B410689, B410789, POOL
Total Radiocesium	NP	0.0866		B110889, B111189, B410789, POOL

Table 8
ANOVA Statistical Comparisons of Chemical Concentrations in 1992 Groundwater From Upgradient and Downgradient Monitoring Wells at the West Spray Field (Analytes with More than 50% Quantified Results)

Analyte[1]	ANOVA Method Used[2]	Probability Value (P)	Conclusion If P < 0.05[3]	Wells Compared Using ANOVA Methods[4]
Tritium	LN	0.0766		5086, B110889, B110989, B111189, B410589, B410689, B410789, POOL
Uranium - 233, 234	NP	0.0003	#	B410589 > B410789 > B410689 > B110889 > B110989 > 5086 > POOL > B111189 (35.3 > 28.6 > 24.3 > 22.3 > 14.0 > 11.7 > 10.3 > 9.0)
Uranium - 235	NP	0.5843		5086, B110889, B110989, B111189, B410589, B410689, B410789, POOL
Uranium - 238	NP	0.0003	#	B410589 > B410789 > B410689 > B110889 > B111189 > 5086 > POOL > B110989 (37.4 > 32.4 > 28.8 > 26.2 > 24.0 > 14.8 > 10.0 > 8.3)
Americium - 241 (total)	NP	0.2608		5086, B110889, B110989, B111189, B410589, B410689, B410789, POOL
Plutonium - 239, 240 (total)	NP	0.1601		5086, B110889, B110989, B111189, B410589, B410689, B410789, POOL
Tritium (total)	NP	0.1949		5086, B110889, B110989, B111189, B410589, B410689, B410789, POOL

[1] Metals are dissolved metals, unless otherwise stated.

Radionuclides are dissolved radionuclides, unless otherwise stated.

[2] N = ANOVA method for normally distributed data
LN = ANOVA method for lognormally distributed data
NP = ANOVA method for non-parametric (undistributed) data

[3] * Indicates that the analyte concentrations in the downgradient wells listed are statistically greater than the analyte concentrations in the upgradient POOL wells. This may indicate downgradient contamination.

** Indicates that the analyte concentrations in the upgradient POOL wells are statistically greater than the analyte concentrations in the downgradient wells listed. This may indicate a possible upgradient source.

# Indicates a statistically significant difference between some wells within the data set. The statistical method does not identify the locations that differ statistically. Contaminant distribution must be evaluated to determine if downgradient contamination is present.

[4] If P < 0.05, wells are compared using their simultaneous upper confidence limit (for normally and lognormally distributed data) or mean score (for non-parametric data). For non-parametric data, mean scores are also presented for each well, respectively.

POOL consists of Wells 5186 and 46192.

Table 9
Infrequently Detected Analytes in 1992 Groundwater From Upgradient or Downgradient Monitoring Wells at the Present Landfill (Analytes with Fewer than 50% Quantified Results)

Well ID	Sampling Date	Analyte	Concentration	Units	Lab Qualifier[1]
B206989	10/13/92	Acetone	12	µg/l	B
B207089	10/14/92	Ammonia	0.08	mg/l	-
4087	04/28/92	Chloride	84.00	mg/l	-
B207089	04/28/92	Orthophosphate	0.02	mg/l	-
4087	02/21/92	Silica (dissolved)	5.60	mg/l	-
B207089	02/20/92	Silica (dissolved)	2.60	mg/l	-
B207189	02/20/92	Silica (dissolved)	4.40	mg/l	-
B207089	04/28/92	Mercury	0.33	µg/l	-
4087	04/28/92	Silicon	5,900.00	µg/l	-
B207189	07/17/92	Silicon	4,990.00	µg/l	-

[1] B = analyte also detected in laboratory method blank

Table 10
ANOVA Statistical Comparisons of Chemical Concentrations in 1992 Groundwater From Upgradient and Downgradient Monitoring Wells at the Present Landfill (Analytes with More than 50% Quantified Results)

Analyte[1]	ANOVA Method Used[2]	Probability Value (P)	Conclusion If P < 0.05[3]	Wells Compared Using ANOVA Methods[4]
Acetone	NP	0.1388		B207189, POOL
Aluminum	NP	0.0712		4087, B207089, B207189, POOL
Antimony	NP	0.4063		B207189, POOL
Arsenic	NP	0.05	#	B207189 > POOL (23.0 > 12.7)
Barium	NP	0.0179	#	B207189 > POOL > B207089 > 4087 (32.5 > 17.8 > 9.9 > 6.0)
Calcium	NP	0.0004	#	B207089 > 4087 > B207189 > POOL (31.5 > 28.5 > 26.5 > 13.0)
Chromium	NP	0.0707		4087, POOL
Copper	NP	0.7442		4087, B207189, POOL
Iron	LN	0.3329		4087, B207089, B207189, POOL
Lithium	NP	0.0007	#	B207089 > 4087 > B207189 > POOL (30.8 > 28.5 > 26.5 > 13.1)
Magnesium	NP	0.0004	#	B207089 > 4087 > B207189 > POOL (31.5 > 28.5 > 26.5 > 13.0)
Manganese	NP	0.0049	#	4087 > B207189 > B207089 > POOL (31.5 > 28.5 > 25.5 > 13.6)
Molybdenum	NP	0.0943		4087, B207189, POOL
Nickel	NP	0.0395	#	4087 > POOL > B207189 (27.0 > 14.1 > 7.0)

Table 10
ANOVA Statistical Comparisons of Chemical Concentrations in 1992 Groundwater From Upgradient and Downgradient Monitoring Wells at the Present Landfill (Analytes with More than 50% Quantified Results)

Analyte[1]	ANOVA Method Used[2]	Probability Value (P)	Conclusion If $P < 0.05$[3]	Wells Compared Using ANOVA Methods[4]
Potassium	NP	0.0013	#	B207089 > B207189 > 4087 > POOL (30.8 > 30.0 > 21.5 > 13.4)
Selenium	NP	0.0376	#	4087 > POOL > B207189 (27.5 > 13.8 > 10.0)
Silicon	NP	0.1094		B207089, POOL
Sodium	NP	0.0004	#	B207089 > B207189 > 4087 > POOL (31.5 > 28.5 > 26.5 > 13.0)
Strontium	NP	0.0004	#	B207089 > B207189 > 4087 > POOL (31.5 > 28.5 > 26.5 > 13.0)
Thallium	NP	0.2931		4087, POOL
Vanadium	NP	0.0136	#	B207089 > B207189 > 4087 > POOL (27.4 > 20.5 > 18.5 > 12.6)
Zinc	NP	0.6618		4087, B207089, B207189, POOL
Bicarbonate (as $CaCO_3$)	NP	0.0004	#	B206989 > B207089 > 4087 > B207189 > POOL (37.5, 34.0, 30.5, 17.0, 14.8)
Carbonate (as $CaCO_3$)	NP	0.7779		4087, B207189, POOL
Chemical Oxygen Demand	NP	0.2396		B207089, POOL
Chloride	NP	0.0005	#	B207189 > B207089 > B206989 > POOL (28.5 > 25.5 > 22.5 > 11.0)
Fluoride	NP	0.0229	#	4087 > B207189 > B207089 > POOL (28.5 > 20.3 > 18.9 > 12.1)

Table 10
ANOVA Statistical Comparisons of Chemical Concentrations in 1992 Groundwater From Upgradient and Downgradient Monitoring Wells at the Present Landfill (Analytes with More than 50% Quantified Results)

Analyte[1]	ANOVA Method Used[2]	Probability Value (P)	Conclusion If P < 0.05[3]	Wells Compared Using ANOVA Methods[4]
Nitrate/Nitrite	NP	0.0023	#	B206989 > POOL > B207089 > B207189 > 4087 (28.5 > 17.7 > 9.5 > 4.3 > 4.2)
Sulfate	NP	0.0003	#	B206989 > B207089 > 4087 > B207189 > POOL (37.5 > 33.2 > 32.5 > 19.7 > 14.5)
Total Dissolved Solids	NP	0.0001	#	B206989 > B207089 > B207189 > 4087 > POOL (37.5 > 34.0 > 30.0 > 27.5 > 13.5)
Total Organic Carbon	NP	0.091		B207089, POOL
Total Suspended Solids	NP	0.0017	#	POOL > B206989 > 4087 > B207089 > B207189 (22.1 > 12.5 > 11.0 > 6.2 > 6.0)
Cesium - 137	N	0.286		B207089, POOL
Gross Alpha	NP	0.0001	#	4087 > B207089 > B207189 > POOL (38.5 > 29.8 > 28.0 > 14.4)
Gross Beta	NP	0.0001	#	4087 > B207189 > B207089 > POOL (35.5 > 34.1 > 33.0 > 14.2)
Radium - 226	NP	0.0756		B207089, POOL
Strontium - 89, 90	NP	0.3525		B207089, POOL
Tritium	N	0.1174		4087, B207089, POOL
Uranium - 233, 234	NP	0.0121	#	4087 > B207089 > B207189 > POOL (26.5 > 22.7 > 15.5 > 11.3)
Uranium - 235	NP	0.0439	#	4087 > B207089 > B207189 > POOL (26.5 > 14.2 > 13.7 > 4.3)

Table 10
ANOVA Statistical Comparisons of Chemical Concentrations in 1992 Groundwater From Upgradient and Downgradient Monitoring Wells at the Present Landfill (Analytes with More than 50% Quantified Results)

Analyte[1]	ANOVA Method Used[2]	Probability Value (P)	Conclusion If P < 0.05[3]	Wells Compared Using ANOVA Methods[4]
Uranium - 238	NP	0.0116	#	4087 > B207089 > POOL > B207189 (26.5 > 23.0 > 11.9 > 9.0)
Americium - 241 (total)	NP	0.7871		B207089, POOL
Plutonium - 239, 240 (total)	NP	0.3221		B207089, POOL
Tritium (total)	NP	0.2328		B207189, POOL

[1] Metals are dissolved metals, unless otherwise stated.

Radionuclides are dissolved radionuclides, unless otherwise stated.

[2] N = ANOVA method for normally distributed data
LN = ANOVA method for lognormally distributed data
NP = ANOVA method for non-parametric (undistributed) data

[3] • Indicates that the analyte concentrations in the downgradient wells listed are statistically greater than the analyte concentrations in the upgradient POOL wells. This may indicate downgradient contamination.

** Indicates that the analyte concentrations in the upgradient POOL wells are statistically greater than the analyte concentrations in the downgradient wells listed. This may indicate upgradient source.

# Indicates a statistically significant difference between some wells within the data set. The statistical method does not identify the locations that differ statistically. Contaminant distribution must be evaluated to determine if downgradient contamination is present.

[4] If P < 0.05, wells are compared using their simultaneous upper confidence limit (for normally and lognormally distributed data) or mean score (for non-parametric data). For non-parametric data, mean scores are also presented for each well, respectively.

POOL consists of Wells 1086, 5887, and 6087.

READ_ME.WP

This disk contains files for Appendices A, B, and C of the 1992 Annual RCRA Groundwater Monitoring Report For Regulated Units At The Rocky Flats Plant - Addendum.

Appendix A (chemical concentration and radiological activity data) consists of eight Word Perfect files which have been zipped together into a self-extracting file named DATA.EXE. These Word Perfect files were created by importing ASCII text files from EG&G and formatting them in Word Perfect. UP_M.WP contains metal concentration data. UP_R.WP contains radiological activity data. UP_A.WP contains water quality parameter data. UP_V.WP contains volatile organic compound concentration data. The files sizes are as follows:

UP_M.WP = 1,253,952 bytes
UP_R.WP = 473,073 bytes
UP_A.WP = 601,086 bytes
UP_V.WP = 2,027,856 bytes

To extract the files, copy DATA.EXE to the directory in which you want to copy the files to, and type "DATA.EXE". KEY.WP is a Word Perfect document that contains information for creating a dBase structure for importing ASCII text files of chemical concentration data, and contains column headers and column widths.

Appendix B (infrequently detected analytes) consists of only one file, EXCEED.XLS. This is an Excel 4.0 file, and is not compressed.

Appendix C (ANOVA statistical comparisons data) consists of three Word Perfect files which have been zipped together into a the self-extracting file named STATS2.EXE. These Word Perfect files were created by importing ASCII text files from EG&G and formatting them in Word Perfect. NORM.WP contains the statistical comparisons of normally distributed data. LOG.WP contains the statistical comparisons of lognormally distributed data. NONPAR.WP contains the statistical comparisons of non-parametrically distributed data. The Files sizes are as follows:

NORM.WP = 39,341 bytes
LOG.WP = 67,565 bytes
NONPAR.WP = 271,908 bytes

To extract the files, copy STATS2.EXE to the directory in which you want to copy the files to, and type "STATS2.EXE".

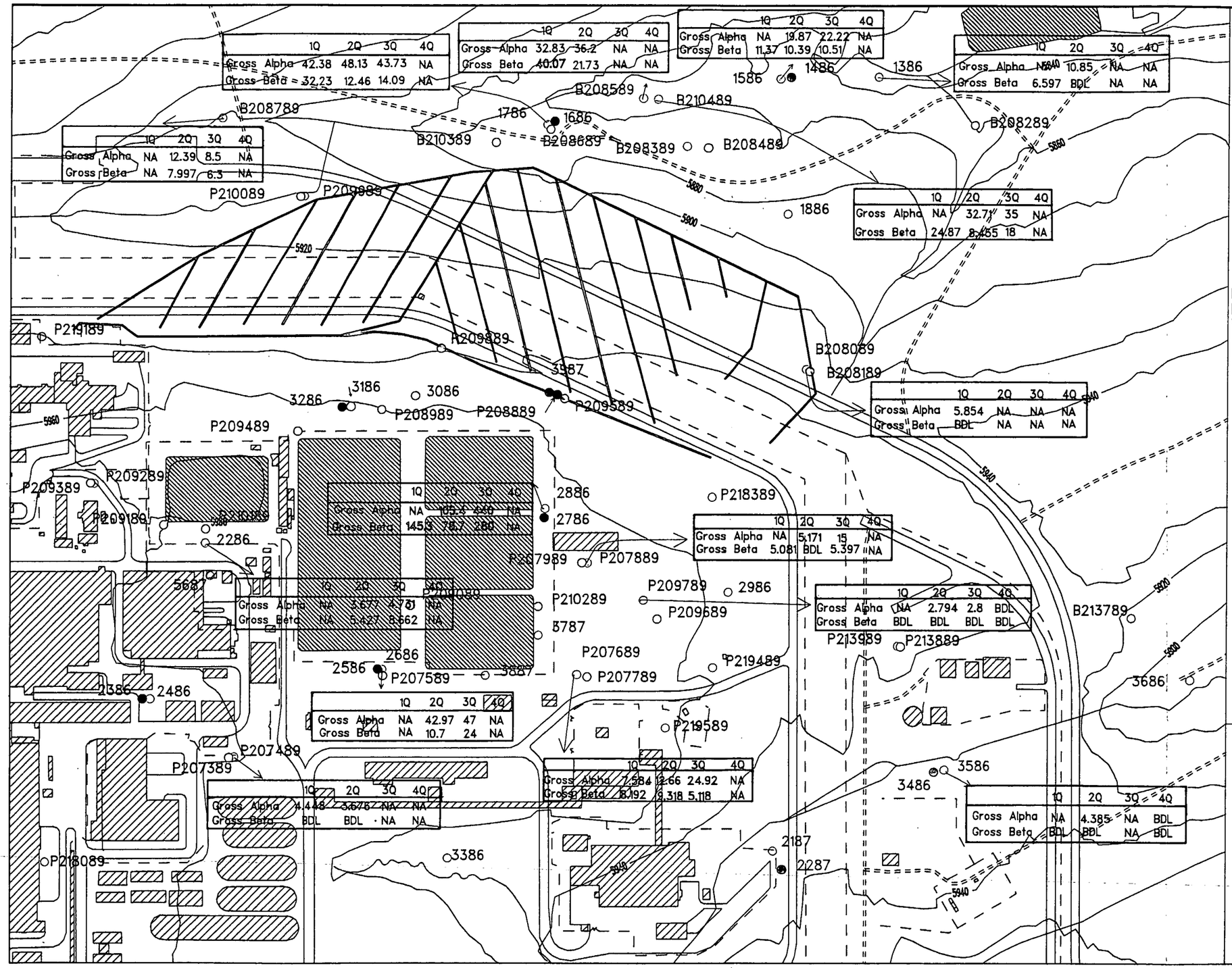
READ_ME.WP is a Word Perfect Document

KEY FOR ANALYTICAL RESULTS DATA

154 character widths wide

Char. #	Data Type[1]	Field Title	Field Width
1-8	C	LOCATION	(8 char. wide)
9-12	C	QC	(4 char. wide)
13-32	C	SAMPLE	(20 char. wide)
33-42	D	SDATE	(10 char. wide)
43-45	C	ID	(3 char. wide)
46-55	C	GROUP	(10 char. wide)
56-85	C	ANALYTE	(30 char. wide)
86-97	R	RESULT	(12 char. wide)
98-103	C	UNITS	(6 char. wide)
104-115	R	ERROR	(12 char. wide)
116-120	C	QUAL	(5 char. wide)
121-132	R	RL	(12 char. wide)
133-134	C	VAL	(2 char. wide)
135-136	C	GRAD	(2 char. wide)
137-139	C	LOC	(3 char. wide)
140-142	C	STRAT	(3 char. wide)
143-154	R	QUARTER	(12 char. wide)

1. For structuring a dBase file



	1Q	2Q	3Q	4Q
Gross Alpha	42.38	48.13	43.73	NA
Gross Beta	32.23	12.46	14.09	NA

	1Q	2Q	3Q	4Q
Gross Alpha	32.83	36.2	NA	NA
Gross Beta	40.07	21.73	NA	NA

	1Q	2Q	3Q	4Q
Gross Alpha	NA	19.87	22.22	NA
Gross Beta	11.37	10.39	10.51	NA

	1Q	2Q	3Q	4Q
Gross Alpha	NA	10.85	NA	NA
Gross Beta	6.597	BDL	NA	NA

	1Q	2Q	3Q	4Q
Gross Alpha	NA	12.39	8.5	NA
Gross Beta	NA	7.997	6.3	NA

	1Q	2Q	3Q	4Q
Gross Alpha	NA	32.7	35	NA
Gross Beta	24.87	8.455	18	NA

	1Q	2Q	3Q	4Q
Gross Alpha	5.854	NA	NA	NA
Gross Beta	BDL	NA	NA	NA

	1Q	2Q	3Q	4Q
Gross Alpha	NA	105.4	440	NA
Gross Beta	145.3	78.7	280	NA

	1Q	2Q	3Q	4Q
Gross Alpha	NA	5.171	15	NA
Gross Beta	5.081	BDL	5.397	NA

	1Q	2Q	3Q	4Q
Gross Alpha	NA	3.677	4.751	NA
Gross Beta	NA	5.427	8.662	NA

	1Q	2Q	3Q	4Q
Gross Alpha	NA	2.794	2.8	BDL
Gross Beta	BDL	BDL	BDL	BDL

	1Q	2Q	3Q	4Q
Gross Alpha	NA	42.97	47	NA
Gross Beta	NA	10.7	24	NA

	1Q	2Q	3Q	4Q
Gross Alpha	7.584	12.66	24.92	NA
Gross Beta	8.192	8.318	5.118	NA

	1Q	2Q	3Q	4Q
Gross Alpha	4.448	3.676	NA	NA
Gross Beta	BDL	BDL	NA	NA

	1Q	2Q	3Q	4Q
Gross Alpha	NA	4.385	NA	BDL
Gross Beta	BDL	BDL	NA	BDL

U.S. Department of Energy
Rocky Flats Plant, Golden, Colorado

Solar Evaporation Ponds

1992 Annual RCRA Groundwater Monitoring Report Addendum

Gross Alpha and Gross Beta Activities (pCi/l) in 1992 Groundwater from Quaternary Materials

Figure 2-1

	1Q	2Q	3Q	4Q
Gross Alpha	47.44	58.7	74.24	NA
Gross Beta	36.71	38.97	35.76	NA

	1Q	2Q	3Q	4Q
Gross Alpha	NA	NA	151.9	97
Gross Beta	NA	NA	37.51	82

	1Q	2Q	3Q	4Q
Gross Alpha	4.805	NA	11.74	BDL
Gross Beta	10.53	NA	7.703	BDL

	1Q	2Q	3Q	4Q
Gross Alpha	NA	184.2	121.7	NA
Gross Beta	68.2	78.56	43.14	NA

	1Q	2Q	3Q	4Q
Gross Alpha	NA	50.67	36.06	64
Gross Beta	43.62	62.97	39.42	98

	1Q	2Q	3Q	4Q
Gross Alpha	BDL	2.379	BDL	NA
Gross Beta	BDL	BDL	BDL	NA

	1Q	2Q	3Q	4Q
Gross Alpha	NA	68.55	96	NA
Gross Beta	47.8	26.8	44	NA

	1Q	2Q	3Q	4Q
Gross Alpha	NA	3.37	3.812	BDL
Gross Beta	4.485	4.417	7.175	BDL

	1Q	2Q	3Q	4Q
Gross Alpha	7.844	7.295	7.032	6.8
Gross Beta	15.89	14.88	25.18	23

	1Q	2Q	3Q	4Q
Gross Alpha	4.149	7.583	5.286	BDL
Gross Beta	BDL	4.916	BDL	BDL

	1Q	2Q	3Q	4Q
Gross Alpha	51.09	NA	NA	NA
Gross Beta	26.11	NA	NA	NA

B208788 B208589 B210489 B208289
B210389 B208689 B208389 B208489
P210089 P209889
1786 1686 1586 1486 1386 1886
P209189 P209889 B208089 B208189
3186 3086 3286 3987 P209589
P208989 P208889
P209489
P209389 P209189 P210189
2286 2786 2886
P207989 P207889 P209789 2986
P210289 P209689 3787
P207689 P213989 P213889 B213789
2686 2586 P207589 3887 P207789 P219489
2386 2486 3686
P219589
P207489 P207389
3586 3486
P218089 3386 2287 2187
5960 5940 5920 5900 5880 5860

EXPLANATION

- Wells (screened in Surficial Material)
- Wells (screened in Bedrock)
- Compliance Boundary
- Rocky Flats Plant Boundary
- Paved Roads
- Dirt Roads
- Streams, Ditches Drainage Features
- Intercepter Trench System
- NA Data Not Available
- BDL Below Detection Limit

Detections Shown in Orange Exceed the Sitewide Background Value for that Analyte (e.g.,Am241 **0.056**)

- Surface Water Impoundments
- Buildings
- CERCLA Characterization Wells
- RCRA Regulatory Wells
- RCRA Characterization Wells
- Special Purpose Wells

N

0 feet 250 500

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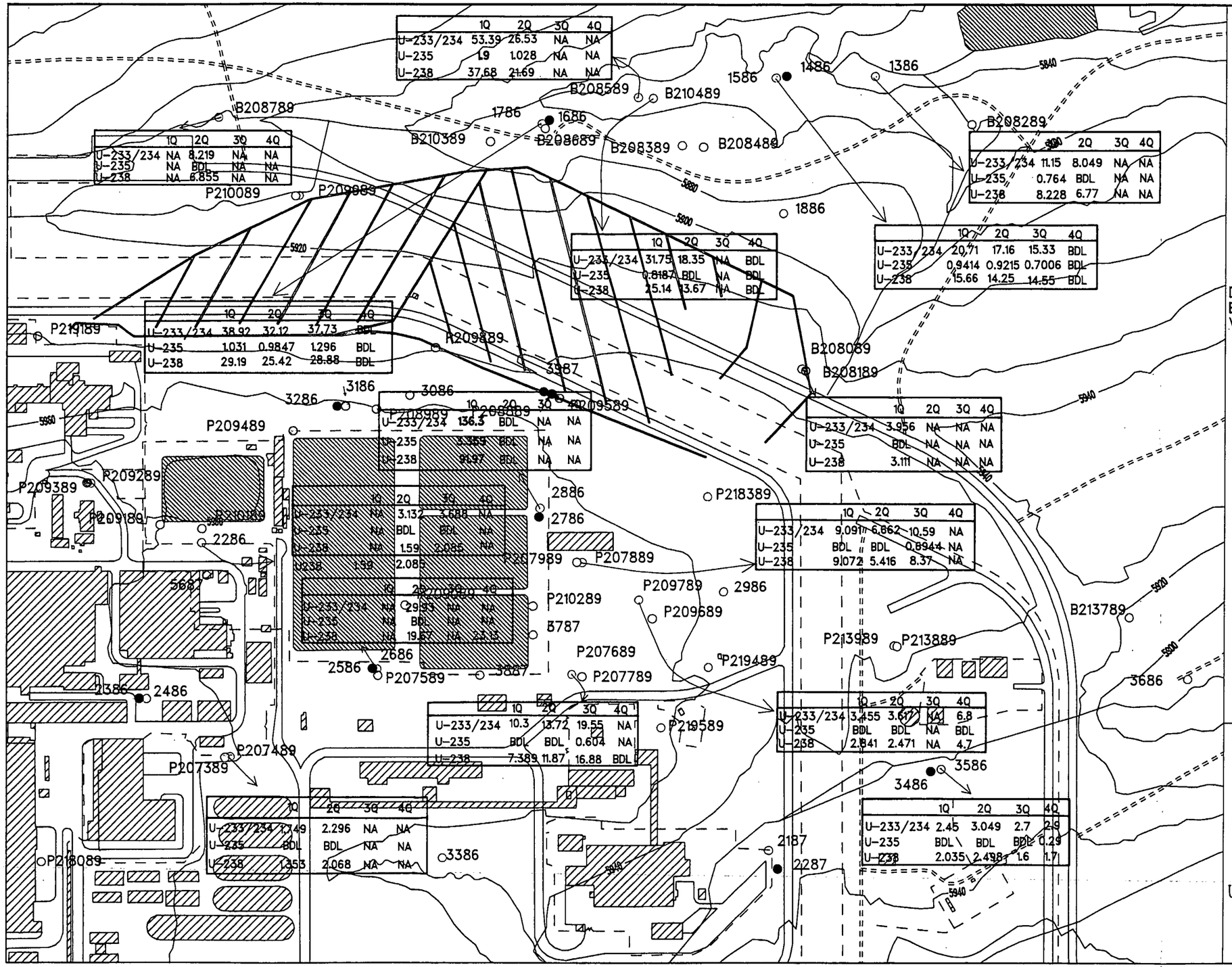
Rocky Flats Plant, Golden, Colorado

Solar Evaporation Ponds

1992 Annual RCRA Groundwater Monitoring Report Addendum

Gross Alpha and Gross Beta Activities (pCi/l) in 1992 Groundwater from Weathered Bedrock

Figure 2-2



	1Q	2Q	3Q	4Q
U-233/234	53.39	26.53	NA	NA
U-235	1.9	1.028	NA	NA
U-238	37.68	21.69	NA	NA

	1Q	2Q	3Q	4Q
U-233/234	NA	8.219	NA	NA
U-235	NA	BDL	NA	NA
U-238	NA	6.855	NA	NA

	1Q	2Q	3Q	4Q
U-233/234	11.15	8.049	NA	NA
U-235		0.764	BDL	NA NA
U-238		8.228	6.77	NA NA

	1Q	2Q	3Q	4Q
U-233/234	31.75	18.35	NA	BDL
U-235		0.8187	BDL	NA BDL
U-238		25.14	13.67	NA BDL

	1Q	2Q	3Q	4Q
U-233/234	20.71	17.16	15.33	BDL
U-235		0.9414	0.9215	0.7006 BDL
U-238		15.66	14.25	14.55 BDL

	1Q	2Q	3Q	4Q
U-233/234	38.92	32.12	37.73	BDL
U-235	1.031	0.9847	1.296	BDL
U-238	29.19	25.42	28.88	BDL

	1Q	2Q	3Q	4Q
U-233/234	136.3	BDL	NA	NA
U-235		3.359	BDL	NA NA
U-238		91.97	BDL	NA NA

	1Q	2Q	3Q	4Q
U-233/234	NA	3.132	2.688	NA
U-235	NA	BDL	BDL	NA
U-238	NA	1.59	2.085	NA

	1Q	2Q	3Q	4Q
U-233/234	NA	29.93	NA	NA
U-235	NA	BDL	NA	NA
U-238	NA	19.67	NA	23.13

	1Q	2Q	3Q	4Q
U-233/234	3.956	NA	NA	NA
U-235	BDL	NA	NA	NA
U-238	3.111	NA	NA	NA

	1Q	2Q	3Q	4Q
U-233/234	9.091	6.862	10.59	NA
U-235	BDL	BDL	0.8944	NA
U-238	9.072	5.416	8.37	NA

	1Q	2Q	3Q	4Q
U-233/234	10.3	13.72	19.55	NA
U-235	BDL	BDL	0.604	NA
U-238	7.389	11.87	16.88	BDL

	1Q	2Q	3Q	4Q
U-233/234	3.455	3.617	NA	6.8
U-235	BDL	BDL	NA	BDL
U-238	2.841	2.471	NA	4.7

	1Q	2Q	3Q	4Q
U-233/234	1.749	2.296	NA	NA
U-235	BDL	BDL	NA	NA
U-238	1.353	2.068	NA	NA

	1Q	2Q	3Q	4Q
U-233/234	2.45	3.049	2.7	2.9
U-235		BDL	BDL	BDL 0.29
U-238		2.035	2.498	1.6 1.7

EXPLANATION

- Wells (screened in Surficial Material)
- Wells (screened in Bedrock)
- Compliance Boundary
- Rocky Flats Plant Boundary
- Paved Roads
- Dirt Roads
- Streams, Ditches Drainage Features
- Intercepter Trench System
- NA — Data Not Available
- BDL — Below Detection Limit

Detections Shown in Orange Exceed the Sitewide Background Value for that Analyte (e.g.,Am241 **0.056**)

- Surface Water Impoundments
- Buildings
- CERCLA Characterization Wells
- RCRA Regulatory Wells
- RCRA Characterization Wells
- Special Purpose Wells

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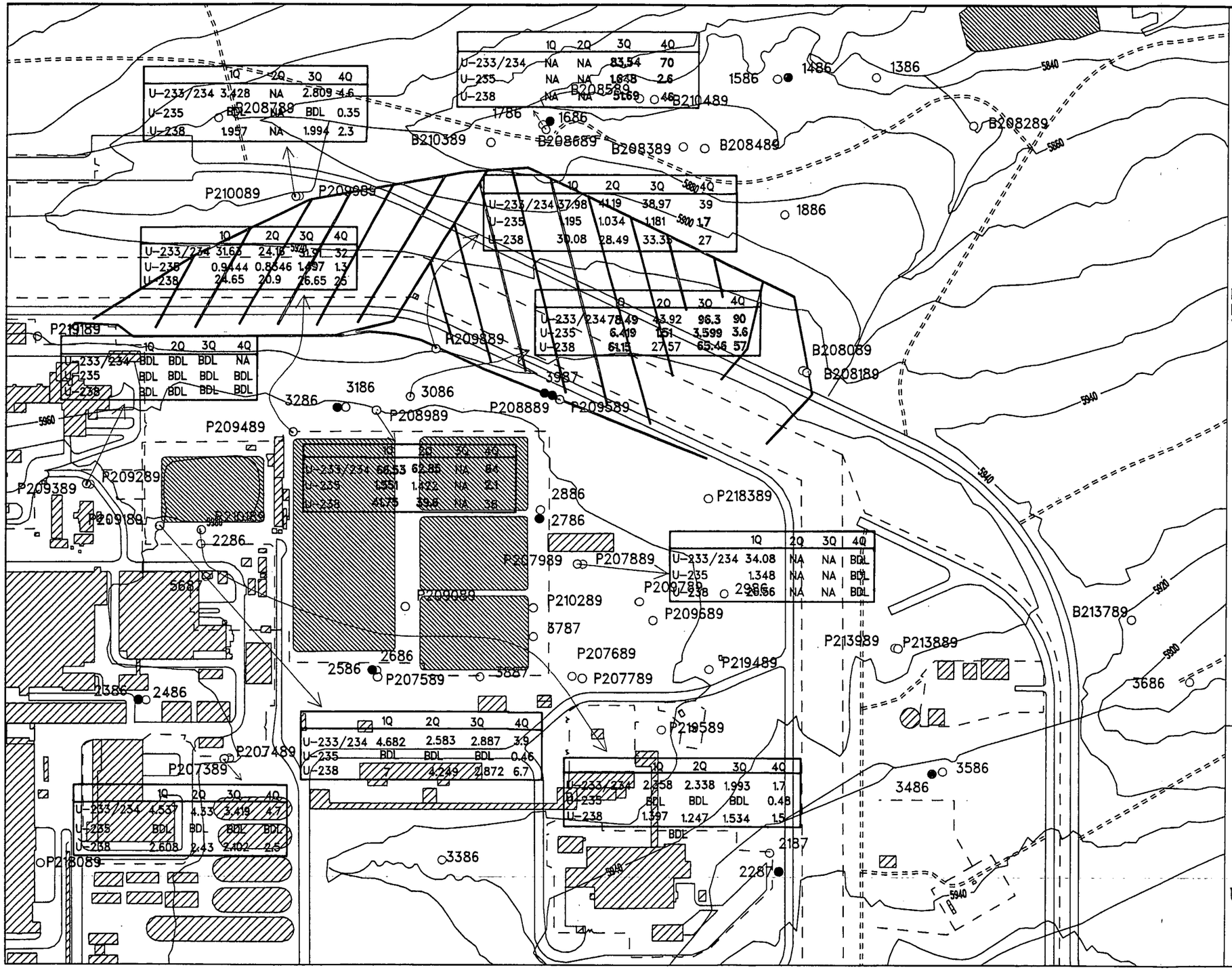
Rocky Flats Plant, Golden, Colorado

Solar Evaporation Ponds

1992 Annual RCRA Groundwater Monitoring Report Addendum

Activities of U-233/234, U-235, and U-238 (pCi/l) in 1992 Groundwater from Quaternary Materials

Figure 2-3


B208789
1Q 2Q 3Q 4Q
U-233/234 3.428 NA 2.809 4.6
U-235 BDL NA BDL 0.35
U-238 1.957 NA 1.994 2.3
B210389
1Q 2Q 3Q 4Q
U-233/234 NA NA 83.54 70
U-235 NA NA 1.838 2.6
U-238 NA NA 51.69 46
B208589
B210489
1586
1486
1386
1786
1686
B208689
B208389
B208489
B208289
P210089
P209989
1886
1Q 2Q 3Q 4Q
U-233/234 31.63 24.16 31.91 32
U-235 0.9444 0.8646 1.697 1.3
U-238 24.65 20.9 26.65 25
1Q 2Q 3Q 4Q
U-233/234 37.98 4.119 38.97 39
U-235 1.195 1.034 1.181 1.7
U-238 30.08 28.49 33.35 27
P219189
1Q 2Q 3Q 4Q
U-233/234 BDL BDL BDL NA
U-235 BDL BDL BDL BDL
U-238 BDL BDL BDL BDL
P209189
1Q 2Q 3Q 4Q
U-233/234 78.49 43.92 96.3 90
U-235 6.419 1.51 3.599 3.6
U-238 61.15 27.57 65.46 57
P209889
B208089
B208189
3987
3286
3186
3086
P208989
P208889
P209589
P209489
P209289
P209389
P209189
2886
2786
P218389
1Q 2Q 3Q 4Q
U-233/234 34.08 NA NA BDL
U-235 1.348 NA NA BDL
U-238 28.56 NA NA BDL
2986
2286
3687
P207989
P207889
P209789
P209089
P210289
P209689
3787
B213789
P213989
P213889
2686
2586
P207689
P219489
P207589
3887
P207789
2386
2486
3686
P219589
1Q 2Q 3Q 4Q
U-233/234 4.682 2.583 2.887 3.9
U-235 BDL BDL BDL 0.46
U-238 4.249 2.872 6.7
P207489
P207389
1Q 2Q 3Q 4Q
U-233/234 4.537 4.53 3.419 4.7
U-235 BDL BDL BDL BDL
U-238 2.608 2.43 2.402 2.5
1Q 2Q 3Q 4Q
U-233/234 2.358 2.338 1.993 1.7
U-235 BDL BDL BDL 0.48
U-238 1.397 1.247 1.534 1.5
BDL
3586
3486
P218089
3386
2187
2287
5940
5960
5920
5900
EXPLANATION
Wells (screened in Surficial Material)
Wells (screened in Bedrock)
Compliance Boundary
Rocky Flats Plant Boundary
Paved Roads
Dirt Roads
Streams, Ditches
Drainage Features
Intercepter Trench System
NA Data Not Available
BDL Below Detection Limit
Detections Shown in Orange
Exceed the Sitewide Background
Value for that Analyte (e.g.,Am241 0.056)
Surface Water Impoundments
Buildings
CERCLA Characterization Wells
RCRA Regulatory Wells
RCRA Characterization Wells
Special Purpose Wells
0 feet
250
500
U.S. Department of Energy
Rocky Flats Plant, Golden, Colorado
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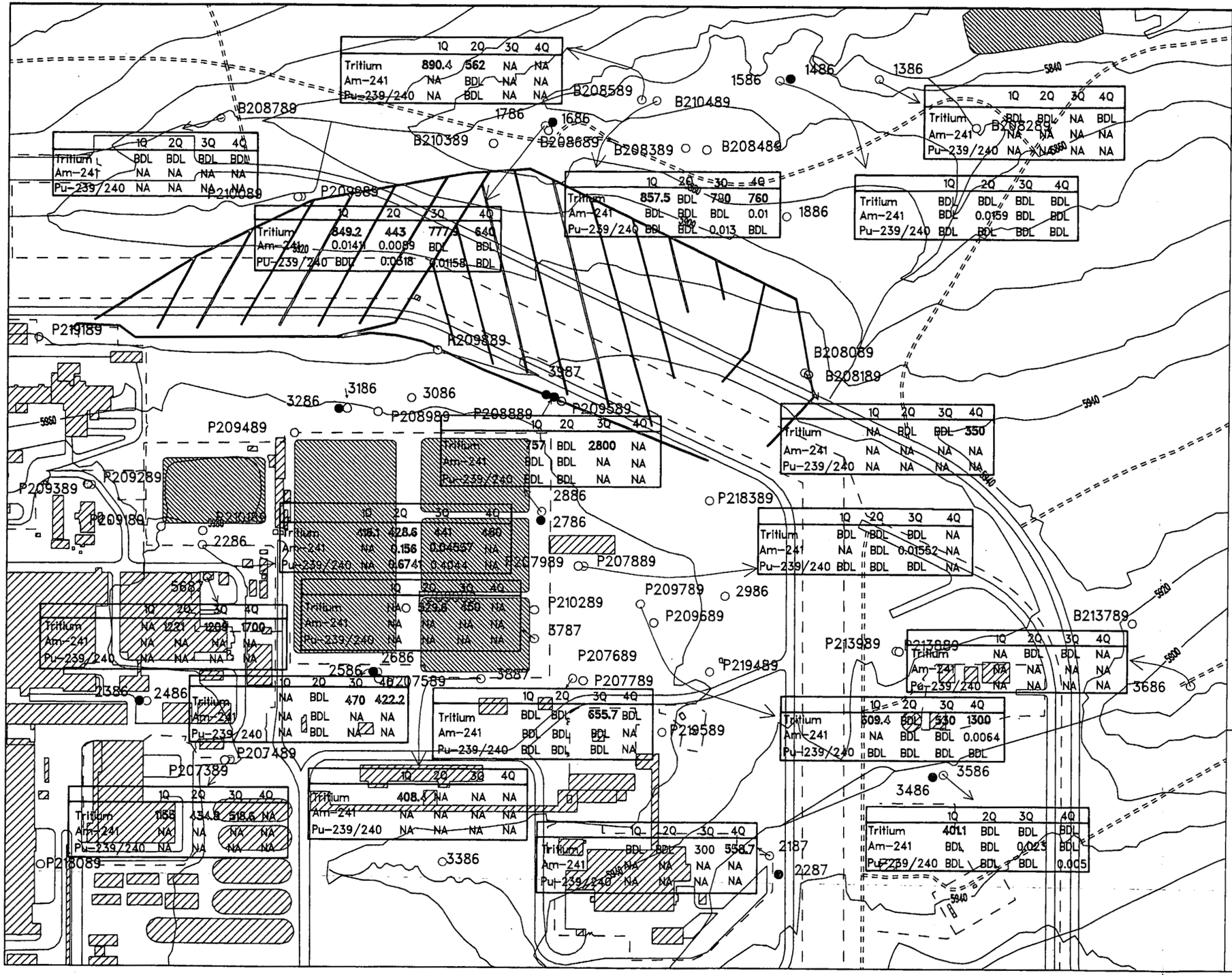
1992 Annual RCRA Groundwater
Monitoring Report Addendum
Activities of
U-233/234, U-235, and U-238 (pCi/l)
in 1992 Groundwater from
Weathered Bedrock
Figure 2-4



	1Q	2Q	3Q	4Q
Tritium	890.4	562	NA	NA
Am-241	NA	BDL	NA	NA
Pu-239/240	NA	BDL	NA	NA

	1Q	2Q	3Q	4Q
Tritium	BDL	BDL	BDL	BDL
Am-241	NA	NA	NA	NA
Pu-239/240	NA	NA	NA	NA

	1Q	2Q	3Q	4Q
Tritium	849.2	443	777.9	640
Am-241	0.0141	0.0089	BDL	BDL
Pu-239/240	BDL	0.0818	0.01158	BDL

	1Q	2Q	3Q	4Q
Tritium	857.5	BDL	780	760
Am-241	BDL	BDL	BDL	0.01
Pu-239/240	BDL	BDL	0.013	BDL

	1Q	2Q	3Q	4Q
Tritium	BDL	BDL	NA	BDL
Am-241	NA	NA	NA	NA
Pu-239/240	NA	NA	NA	NA

	1Q	2Q	3Q	4Q
Tritium	BDL	BDL	BDL	BDL
Am-241	BDL	0.0159	BDL	BDL
Pu-239/240	BDL	BDL	BDL	BDL

	1Q	2Q	3Q	4Q
Tritium	NA	BDL	BDL	350
Am-241	NA	NA	NA	NA
Pu-239/240	NA	NA	NA	NA

	1Q	2Q	3Q	4Q
Tritium	757	BDL	2800	NA
Am-241	BDL	BDL	NA	NA
Pu-239/240	BDL	BDL	NA	NA

	1Q	2Q	3Q	4Q
Tritium	416.1	428.6	441	480
Am-241	NA	0.156	0.04557	NA
Pu-239/240	NA	0.6741	0.4044	NA

	1Q	2Q	3Q	4Q
Tritium	NA	529.6	450	NA
Am-241	NA	NA	NA	NA
Pu-239/240	NA	NA	NA	NA

	1Q	2Q	3Q	4Q
Tritium	NA	1221	1266	1700
Am-241	NA	NA	NA	NA
Pu-239/240	NA	NA	NA	NA

	1Q	2Q	3Q	4Q
Tritium	NA	BDL	470	422.2
Am-241	NA	BDL	NA	NA
Pu-239/240	NA	BDL	NA	NA

	1Q	2Q	3Q	4Q
Tritium	BDL	BDL	655.7	BDL
Am-241	BDL	BDL	BDL	NA
Pu-239/240	BDL	BDL	BDL	NA

	1Q	2Q	3Q	4Q
Tritium	408.4	NA	NA	NA
Am-241	NA	NA	NA	NA
Pu-239/240	NA	NA	NA	NA

	1Q	2Q	3Q	4Q
Tritium	158	434.9	518.6	NA
Am-241	NA	NA	NA	NA
Pu-239/240	NA	NA	NA	NA

	1Q	2Q	3Q	4Q
Tritium	BDL	BDL	300	558.7
Am-241	NA	NA	NA	NA
Pu-239/240	NA	NA	NA	NA

	1Q	2Q	3Q	4Q
Tritium	BDL	BDL	BDL	NA
Am-241	NA	BDL	0.01562	NA
Pu-239/240	BDL	BDL	BDL	NA

	1Q	2Q	3Q	4Q
Tritium	NA	BDL	BDL	NA
Am-241	NA	NA	NA	NA
Pu-239/240	NA	NA	NA	NA

	1Q	2Q	3Q	4Q
Tritium	509.4	BDL	530	1300
Am-241	NA	BDL	BDL	0.0064
Pu-239/240	BDL	BDL	BDL	BDL

	1Q	2Q	3Q	4Q
Tritium	401.1	BDL	BDL	BDL
Am-241	BDL	BDL	0.023	BDL
Pu-239/240	BDL	BDL	BDL	0.005

EXPLANATION

- Wells (screened in Surficial Material)
- Wells (screened in Bedrock)
- Compliance Boundary
- Rocky Flats Plant Boundary
- Paved Roads
- Dirt Roads
- Streams, Ditches Drainage Features
- Intercepter Trench System
- NA — Data Not Available
- BDL — Below Detection Limit

Detections Shown in Orange Exceed the Sitewide Background Value for that Analyte (e.g.,Am241 **0.056**)

- Surface Water Impoundments
- Buildings
- CERCLA Characterization Wells
- RCRA Regulatory Wells
- RCRA Characterization Wells
- Special Purpose Wells

N

0 feet 250 500

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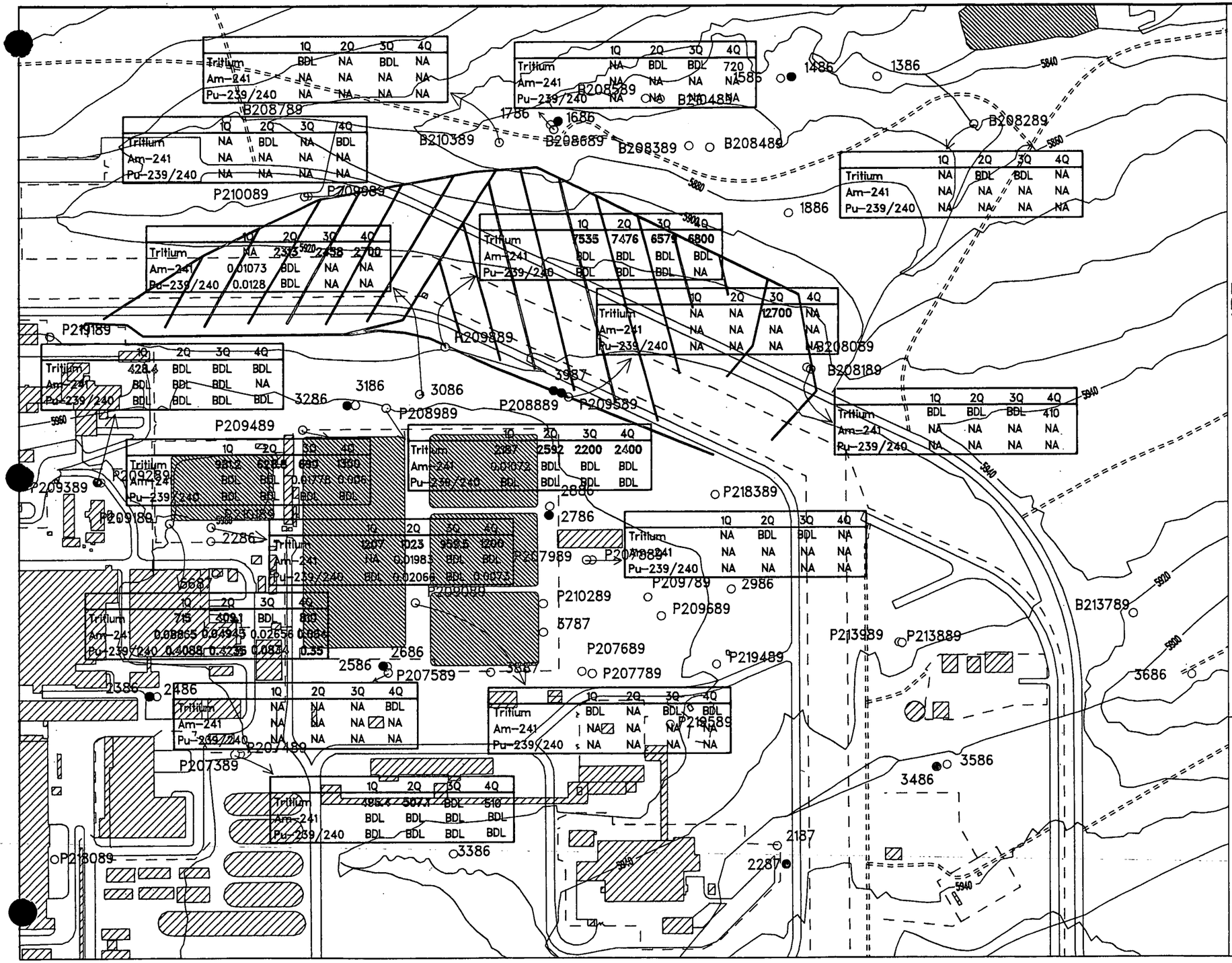
Rocky Flats Plant, Golden, Colorado

Solar Evaporation Ponds

1992 Annual RCRA Groundwater Monitoring Report Addendum

Activities of Tritium, Am-241, and Pu-239/240 (pCi/l) in 1992 Groundwater from Quaternary Materials

Figure 2-5



EXPLANATION

- Wells (screened in Surficial Material)
- Wells (screened in Bedrock)
- Compliance Boundary
- Rocky Flats Plant Boundary
- Paved Roads
- Dirt Roads
- Streams, Ditches Drainage Features
- Intercepter Trench System
- NA — Data Not Available
- BDL — Below Detection Limit

Detections Shown in Orange Exceed the Sitewide Background Value for that Analyte (e.g.,Am241 **0.056**)

- Surface Water Impoundments
- Buildings
- CERCLA Characterization Wells
- RCRA Regulatory Wells
- RCRA Characterization Wells
- Special Purpose Wells

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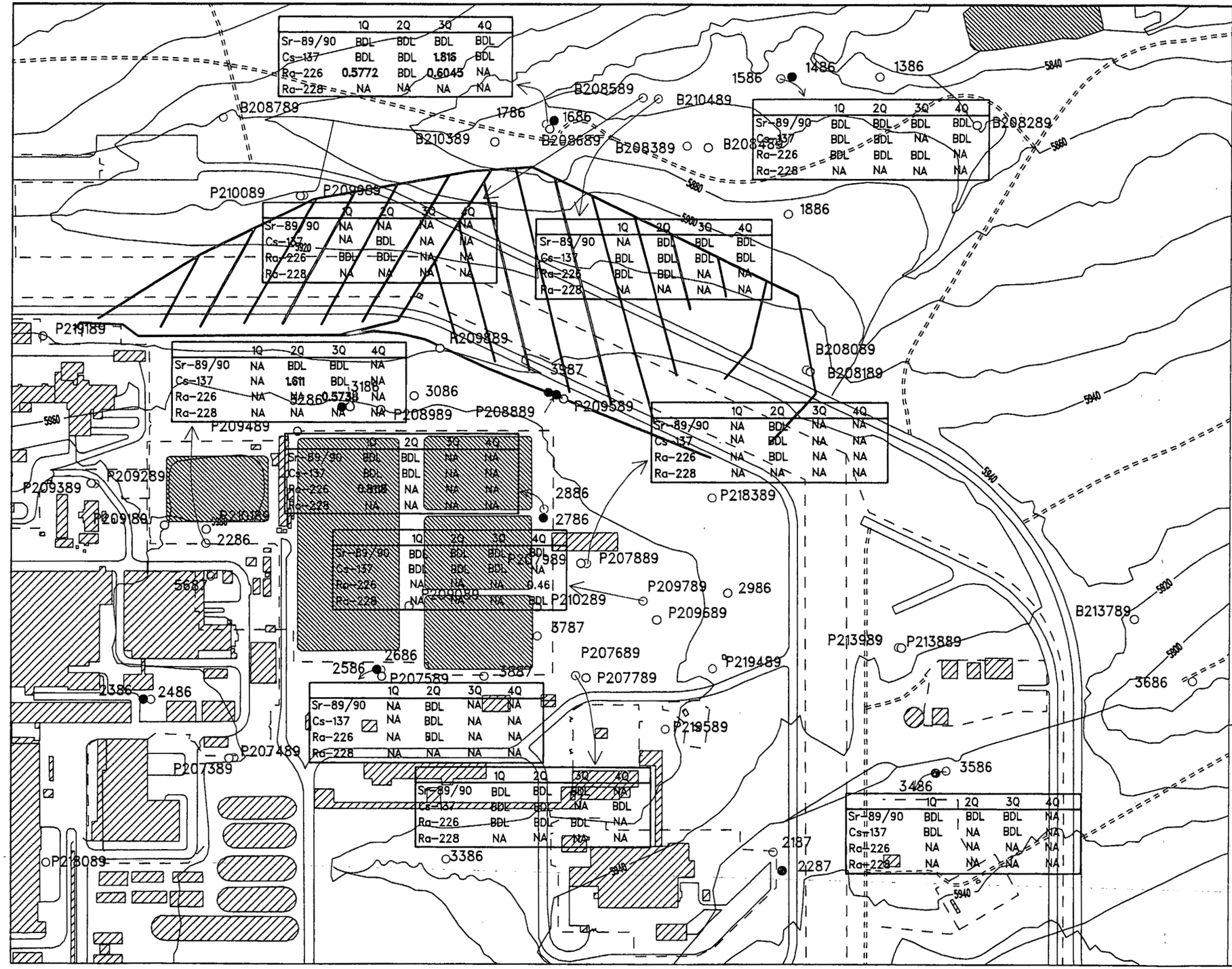
Solar Evaporation Ponds

1992 Annual RCRA Groundwater Monitoring Report Addendum

Activities of Tritium, Am-241, and Pu-239/240 (pCi/l) in 1992 Groundwater from Weathered Bedrock

Figure 2-6



EXPLANATION

- Wells (screened in Surficial Material)
- Wells (screened in Bedrock)
- Compliance Boundary
- Rocky Flats Plant Boundary
- Paved Roads
- Dirt Roads
- Streams, Ditches Drainage Features
- Intercepter Trench System
- NA Data Not Available
- BDL Below Detection Limit

Detections Shown in Orange Exceed the Sitewide Background Value for that Analyte (e.g.,Am241 **0.056**)

- Surface Water Impoundments
- Buildings
- CERCLA Characterization Wells
- RCRA Regulatory Wells
- RCRA Characterization Wells
- Special Purpose Wells

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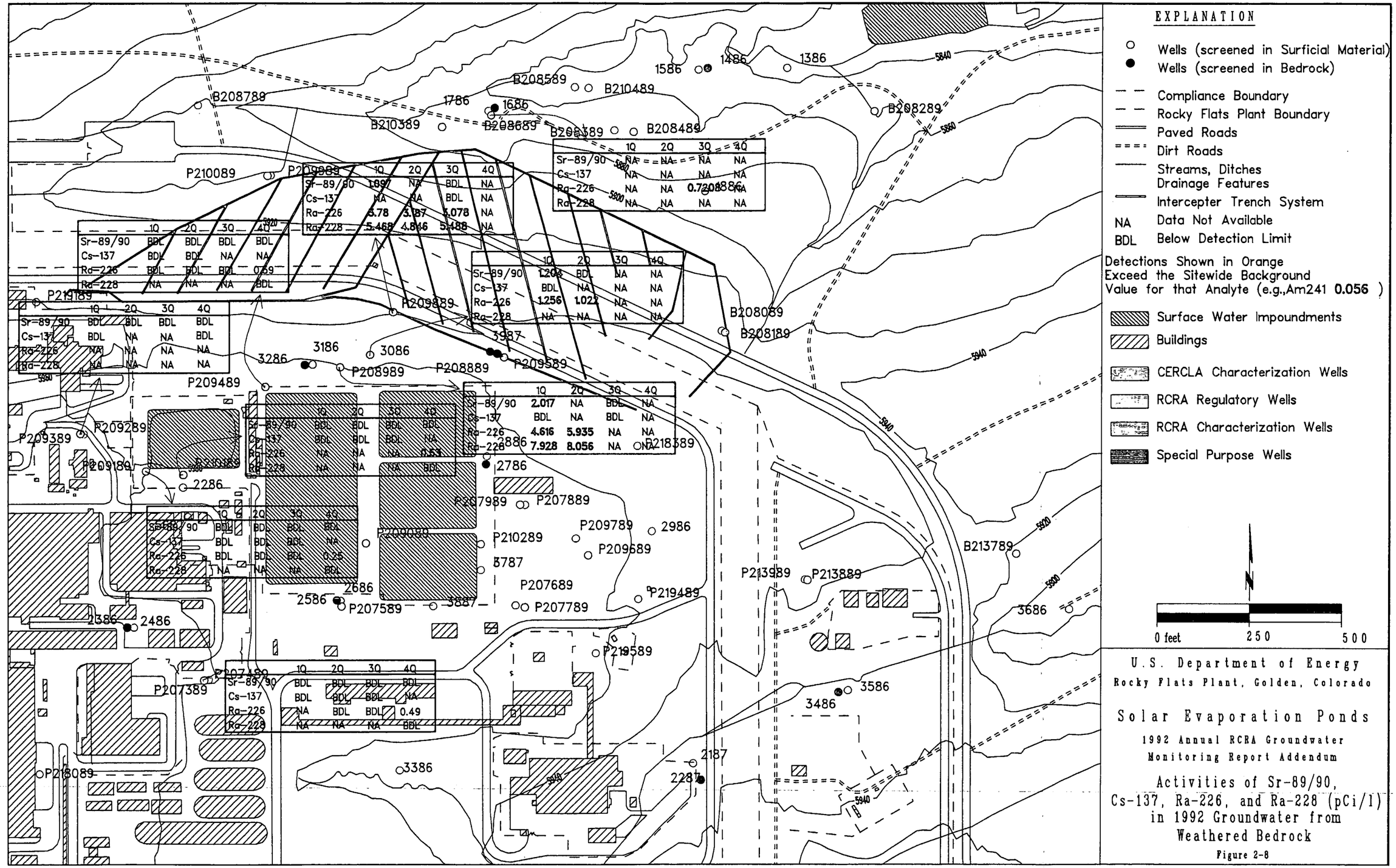
Rocky Flats Plant, Golden, Colorado

Solar Evaporation Ponds

1992 Annual RCRA Groundwater Monitoring Report Addendum

Activities of Sr-89/90, Cs-137, Ra-226, and Ra-228 (pCi/l) in 1992 Groundwater from Quaternary Materials

Figure 2-7



	1Q	2Q	3Q	4Q
Sr-89/90	BDL	BDL	BDL	BDL
Cs-137	BDL	BDL	NA	NA
Ra-226	BDL	BDL	BDL	0.69
Ra-228	NA	NA	NA	BDL

	1Q	2Q	3Q	4Q
Sr-89/90	1.097	NA	BDL	NA
Cs-137	NA	NA	BDL	NA
Ra-226	3.78	3.187	4.078	NA
Ra-228	5.468	4.846	5.488	NA

	1Q	2Q	3Q	4Q
Sr-89/90	NA	NA	NA	NA
Cs-137	NA	NA	NA	NA
Ra-226	NA	NA	0.720	NA
Ra-228	NA	NA	NA	NA

	1Q	2Q	3Q	4Q
Sr-89/90	1.203	BDL	NA	NA
Cs-137	BDL	NA	NA	NA
Ra-226	1.256	1.022	NA	NA
Ra-228	NA	NA	NA	NA

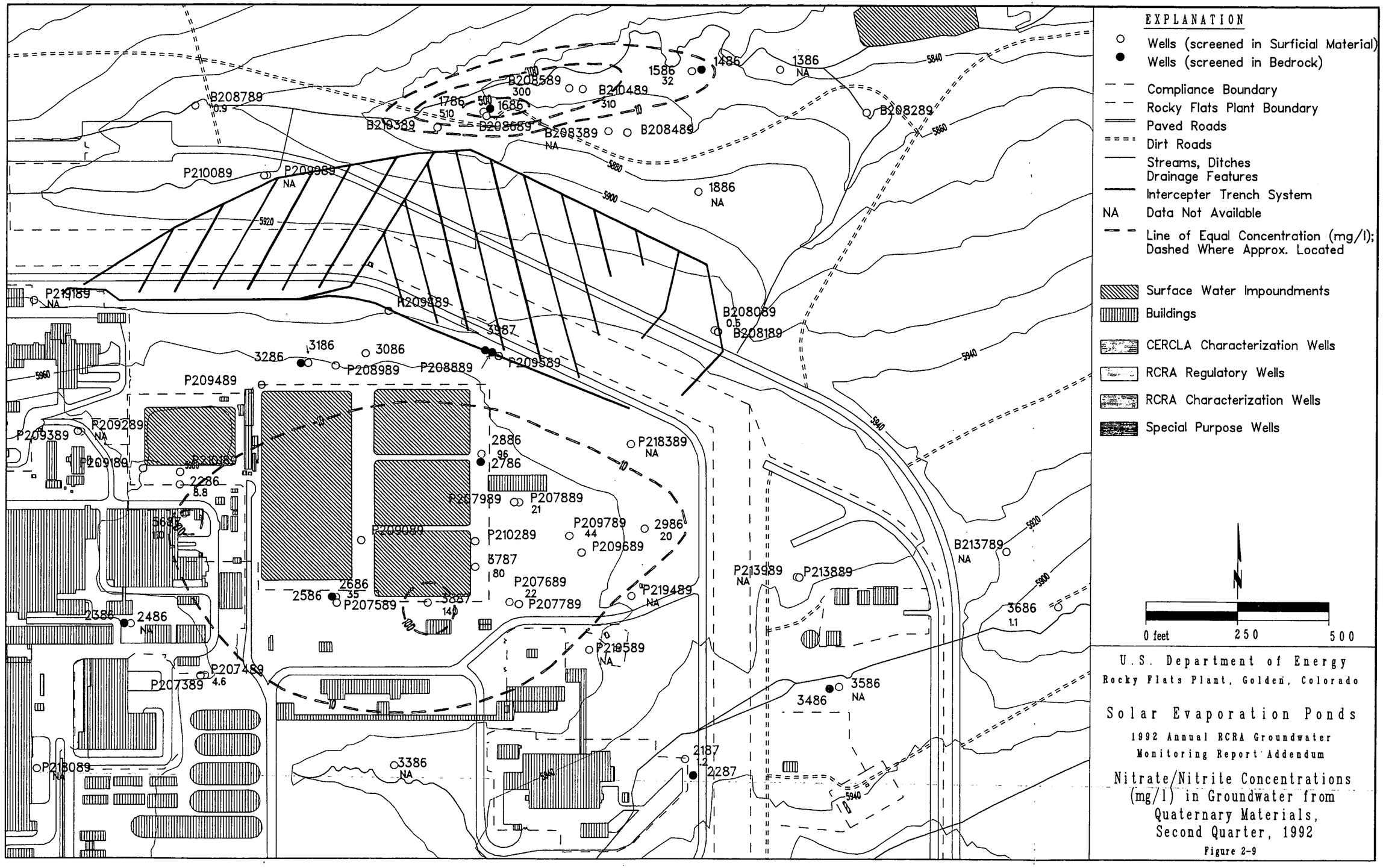
	1Q	2Q	3Q	4Q
Sr-89/90	BDL	BDL	BDL	BDL
Cs-137	BDL	NA	NA	BDL
Ra-226	NA	NA	NA	NA
Ra-228	NA	NA	NA	NA

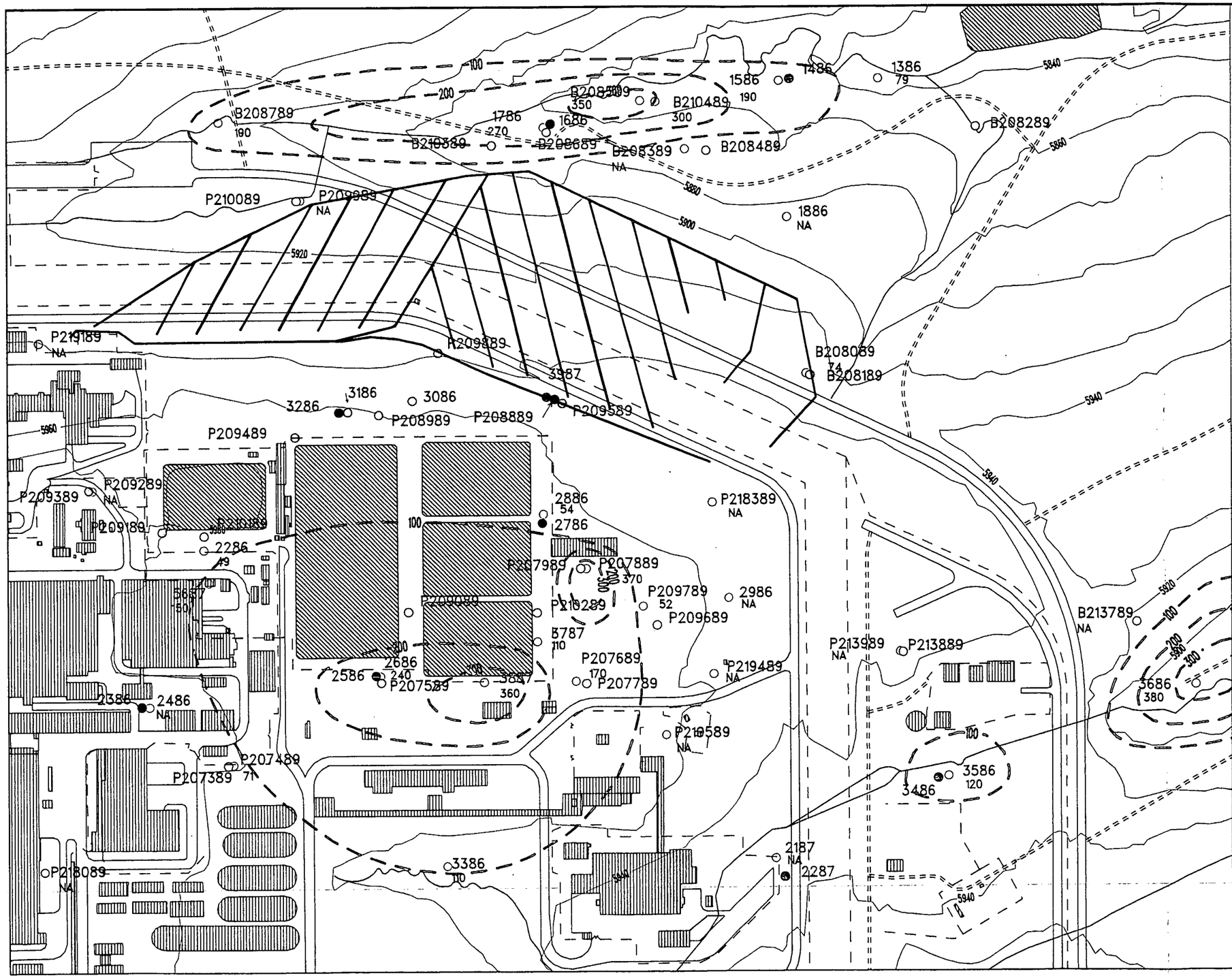
	1Q	2Q	3Q	4Q
Sr-89/90	2.017	NA	BDL	NA
Cs-137	BDL	NA	BDL	NA
Ra-226	4.616	5.935	NA	NA
Ra-226	7.928	8.056	NA	NA

	1Q	2Q	3Q	4Q
Sr-89/90	BDL	BDL	BDL	BDL
Cs-137	BDL	BDL	BDL	NA
Ra-226	NA	NA	NA	0.53
Ra-228	NA	NA	NA	BDL

	1Q	2Q	3Q	4Q
Sr-89/90	BDL	BDL	BDL	BDL
Cs-137	BDL	BDL	BDL	NA
Ra-226	NA	BDL	BDL	0.25
Ra-228	NA	NA	NA	BDL

	1Q	2Q	3Q	4Q
Sr-89/90	BDL	BDL	BDL	BDL
Cs-137	BDL	BDL	BDL	NA
Ra-226	NA	BDL	BDL	0.49
Ra-228	NA	NA	NA	BDL


EXPLANATION
Wells (screened in Surficial Material)
Wells (screened in Bedrock)
Compliance Boundary
Rocky Flats Plant Boundary
Paved Roads
Dirt Roads
Streams, Ditches Drainage Features
Intercepter Trench System
NA Data Not Available
Line of Equal Concentration (mg/l); Dashed Where Approx. Located
Surface Water Impoundments
Buildings
CERCLA Characterization Wells
RCRA Regulatory Wells
RCRA Characterization Wells
Special Purpose Wells
0 feet
250
500
U.S. Department of Energy
Rocky Flats Plant, Golden, Colorado
Solar Evaporation Ponds
1992 Annual RCRA Groundwater Monitoring Report Addendum
Nitrate/Nitrite Concentrations (mg/l) in Groundwater from Quaternary Materials, Second Quarter, 1992
Figure 2-9



EXPLANATION

- Wells (screened in Surficial Material)
- Wells (screened in Bedrock)
- Compliance Boundary
- Rocky Flats Plant Boundary
- Paved Roads
- Dirt Roads
- Streams, Ditches Drainage Features
- Intercepter Trench System
- NA Data Not Available
- Line of Equal Concentration (mg/l); Dashed Where Approx. Located
- Surface Water Impoundments
- Buildings
- CERCLA Characterization Wells
- RCRA Regulatory Wells
- RCRA Characterization Wells
- Special Purpose Wells

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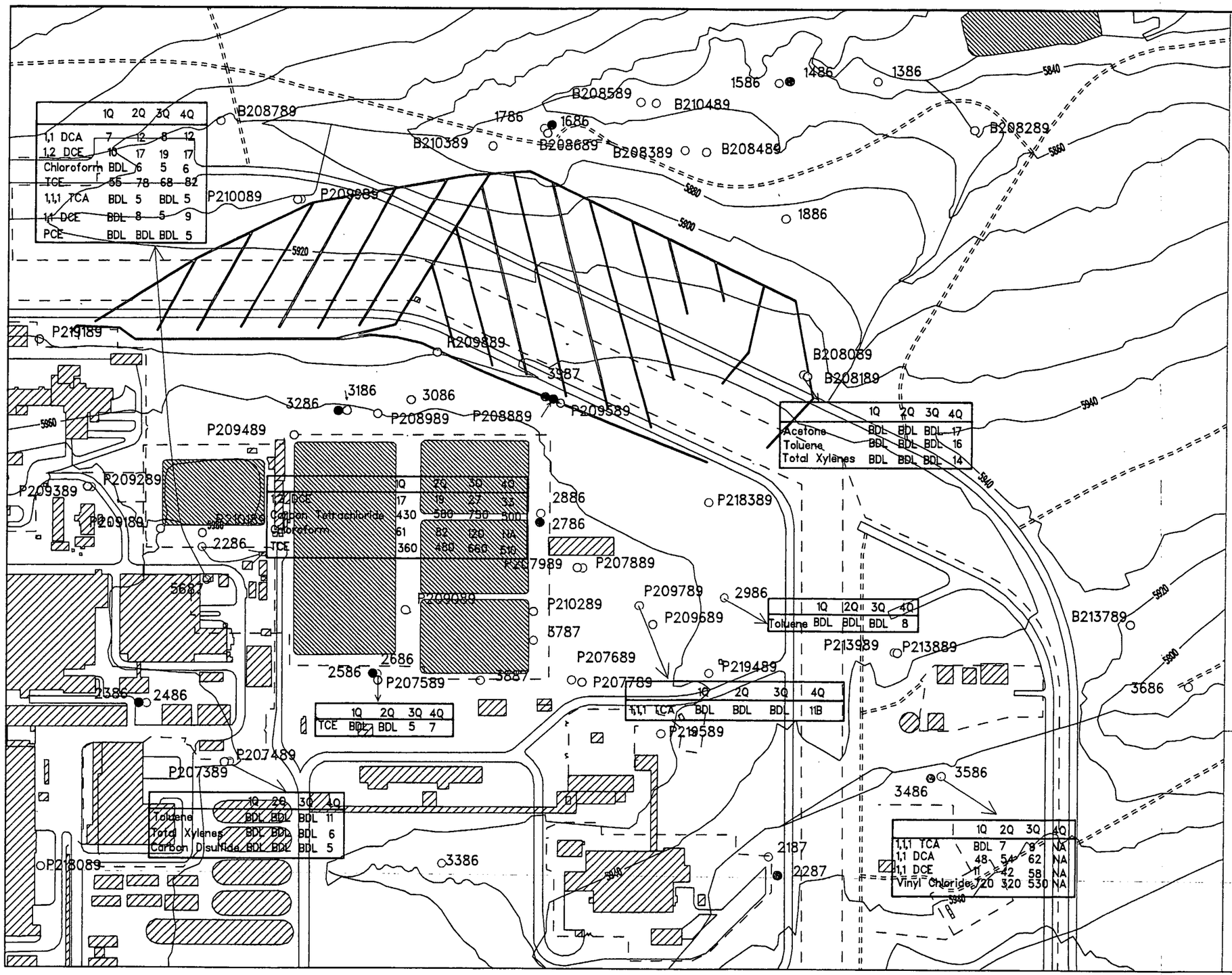
Rocky Flats Plant, Golden, Colorado

Solar Evaporation Ponds

1992 Annual RCRA Groundwater Monitoring Report Addendum

Sulfate Concentrations (mg/l) in Groundwater from Quaternary Materials, Second Quarter, 1992

Figure 2-10


1Q 2Q 3Q 4Q
1,1 DCA 7 12 8 12
1,2 DCE 10 17 19 17
Chloroform BDL 6 5 6
TCE 55 78 68 82
1,1,1 TCA BDL 5 BDL 5
1,1 DCE BDL 8 5 9
PCE BDL BDL BDL 5
1Q 2Q 3Q 4Q
Acetone BDL BDL BDL 17
Toluene BDL BDL BDL 16
Total Xylenes BDL BDL BDL 14
1Q 2Q 3Q 4Q
1,2 DCE 17 19 27 33
Carbon Tetrachloride 430 580 750 500
Chloroform 61 82 120 NA
TCE 360 480 660 510
1Q 2Q 3Q 4Q
Toluene BDL BDL BDL 8
1Q 2Q 3Q 4Q
TCE BDL BDL 5 7
1Q 2Q 3Q 4Q
1,1,1 TCA BDL BDL BDL 11B
1Q 2Q 3Q 4Q
Toluene BDL BDL BDL 11
Total Xylenes BDL BDL BDL 6
Carbon Disulfide BDL BDL BDL 5
1Q 2Q 3Q 4Q
1,1,1 TCA BDL 7 8 NA
1,1 DCA 48 54 62 NA
1,1 DCE 11 42 58 NA
Vinyl Chloride 720 320 530 NA
B208789
B208589
B210489
B210389
B208689
B208389
B208489
B208289
1586
1486
1386
1786
1686
1886
P210089
P209889
P219189
P209889
3987
3186
3086
3286
P208989
P208889
P209589
B208089
B208189
P209489
P209289
P209389
P209189
P210089
2286
2886
2786
P218389
P207989
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P209789
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P209989
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P219489
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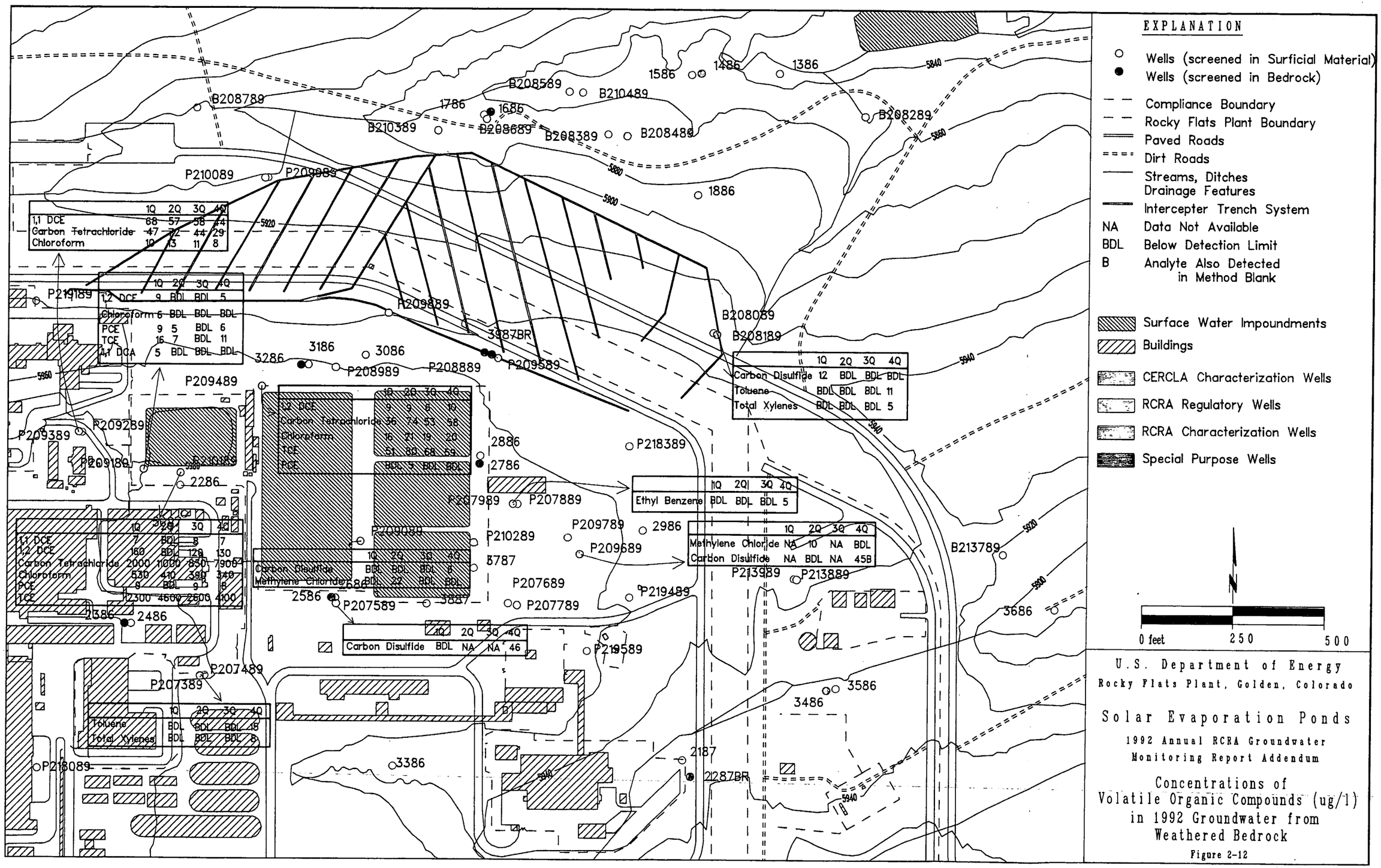
2386
2486
P207489
P207389
P218089
3386
2187
2287
3586
3486
B213789
P213989
P213889
3686
5840
5860
5880
5900
5920
5940
5960
5980
5990
5910
5930
5950
EXPLANATION
Wells (screened in Surficial Material)
Wells (screened in Bedrock)
Compliance Boundary
Rocky Flats Plant Boundary
Paved Roads
Dirt Roads
Streams, Ditches Drainage Features
Intercepter Trench System
NA Data Not Available
BDL Below Detection Limit
B Analyte Also Detected in Method Blank
Surface Water Impoundments
Buildings
CERCLA Characterization Wells
RCRA Regulatory Wells
RCRA Characterization Wells
Special Purpose Wells
0 feet
250
500
U.S. Department of Energy
Rocky Flats Plant, Golden, Colorado
Solar Evaporation Ponds
1992 Annual RCRA Groundwater Monitoring Report Addendum
Concentrations of Volatile Organic Compounds (ug/l) in 1992 Groundwater from Quaternary Materials
Figure 2-11


EXPLANATION
Wells (screened in Surficial Material)
Wells (screened in Bedrock)
Compliance Boundary
Rocky Flats Plant Boundary
Paved Roads
Dirt Roads
Streams, Ditches Drainage Features
Intercepter Trench System
NA Data Not Available
BDL Below Detection Limit
B Analyte Also Detected in Method Blank
Surface Water Impoundments
Buildings
CERCLA Characterization Wells
RCRA Regulatory Wells
RCRA Characterization Wells
Special Purpose Wells
0 feet 250 500
U.S. Department of Energy
Rocky Flats Plant, Golden, Colorado
Solar Evaporation Ponds
1992 Annual RCRA Groundwater Monitoring Report Addendum
Concentrations of Volatile Organic Compounds (ug/l) in 1992 Groundwater from Weathered Bedrock
Figure 2-12
B208789
B208589
B210489
B210389
B208689
B208389
B208489
B208289
1586
1486
1386
1786
1686
1886
P210089
P209989
P209889
P209589
P209489
P209289
P209389
P209189
P219189
P218389
P218089
P208989
P208889
P207989
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P207789
P207589
P207489
P207389
P213989
P213889
P219489
P219589
B208089
B208189
B213789
3087BR
3186
3086
3286
2886
2786
2986
2586
2486
2386
2286
3586
3486
3686
3386
2187
2187BR
5840
5860
5880
5900
5920
5940
5960
1,1 DCE 68 57 58 44
Carbon Tetrachloride 47 32 44 29
Chloroform 10 13 11 8
1,2 DCE 9 BDL BDL 5
Chloroform 6 BDL BDL BDL
PCE 9 5 BDL 6
TCE 16 7 BDL 11
1,1 DCA 5 BDL BDL BDL
1,2 DCE 9 9 6 10
Carbon Tetrachloride 36 74 53 58
Chloroform 16 21 19 20
TCE 51 80 68 59
PCE BDL 5 BDL BDL
Carbon Disulfide 12 BDL BDL BDL
Toluene BDL BDL BDL 11
Total Xylenes BDL BDL BDL 5
1,1 DCE 7 BDL 8 7
1,2 DCE 160 BDL 120 130
Carbon Tetrachloride 2000 11000 830 7900
Chloroform 530 410 390 340
PCE 9 BDL 9 6
TCE 2300 4600 2600 4100
Ethyl Benzene BDL BDL BDL 5
Methylene Chloride NA 10 NA BDL
Carbon Disulfide NA BDL NA 45B
Carbon Disulfide BDL 5 BDL BDL
Methylene Chloride 58 BDL 22 BDL BDL
Carbon Disulfide BDL NA NA 46
Toluene BDL BDL BDL 15
Total Xylenes BDL BDL BDL 8

	1Q	2Q	3Q	4Q
Gross Alpha	2.349	NA	3.2	BDL
Gross Beta	4.148	NA	6.2	BDL

4686
4786

	1Q	2Q	3Q	4Q
Gross Alpha	2.26	BDL	BDL	BDL
Gross Beta	BDL	BDL	BDL	31

	1Q	2Q	3Q	4Q
Gross Alpha	NA	BDL	NA	BDL
Gross Beta	BDL	BDL	NA	BDL

4586

	1Q	2Q	3Q	4Q
Gross Alpha	NA	0.02159	NA	BDL
Gross Beta	NA	0.04211	NA	BDL

46392

	1Q	2Q	3Q	4Q
Gross Alpha	NA	0.0274	NA	BDL
Gross Beta	NA	0.0241	NA	BDL

B110989

	1Q	2Q	3Q	4Q
Gross Alpha	NA	BDL	BDL	NA
Gross Beta	BDL	BDL	BDL	NA

B111189

	1Q	2Q	3Q	4Q
Gross Alpha	BDL	BDL	BDL	NA
Gross Beta	BDL	BDL	BDL	NA

	1Q	2Q	3Q	4Q
Gross Alpha	BDL	BDL	BDL	NA
Gross Beta	BDL	BDL	BDL	NA

B110889

46292

	1Q	2Q	3Q	4Q
Gross Alpha	NA	NA	BDL	BDL
Gross Beta	NA	NA	BDL	BDL

	1Q	2Q	3Q	4Q
Gross Alpha	BDL	BDL	NA	BDL
Gross Beta	4.114	4.468	NA	3.6

P415889

P415989

4886
4986

	1Q	2Q	3Q	4Q
Gross Alpha	NA	BDL	BDL	NA
Gross Beta	BDL	BDL	BDL	NA

46192

B410789

	1Q	2Q	3Q	4Q
Gross Alpha	NA	BDL	NA	NA
Gross Beta	BDL	BDL	NA	NA

P416089

B411289

B411389

5286
5186

	1Q	2Q	3Q	4Q
Gross Alpha	BDL	BDL	BDL	NA
Gross Beta	BDL	BDL	BDL	NA

	1Q	2Q	3Q	4Q
Gross Alpha	BDL	BDL	BDL	NA
Gross Beta	BDL	BDL	BDL	NA

B410689

P416389

	1Q	2Q	3Q	4Q
Gross Alpha	NA	BDL	BDL	BDL
Gross Beta	BDL	BDL	BDL	BDL

	1Q	2Q	3Q	4Q
Gross Alpha	BDL	BDL	BDL	NA
Gross Beta	BDL	BDL	BDL	NA

5086

B410589

	1Q	2Q	3Q	4Q
Gross Alpha	BDL	BDL	BDL	BDL
Gross Beta	BDL	BDL	BDL	BDL

B402689

5686

6000 6020 6040 6060 6080

EXPLANATION

- Wells (screened in Surficial Material)
- Wells (screened in Bedrock)
- Compliance Boundary
- Operable Unit Boundary
- Rocky Flats Plant Boundary
- Paved Roads
- Dirt Roads
- Streams, Ditches Drainage Features
- NA — Data Not Available
- BDL — Below Detection Limit

Detections Shown in Orange Exceed the Sitewide Background Value for that Analyte (e.g.,Am241 0.056)

- Surface Water Impoundments
- Buildings
- Background Characterization Wells
- CERCLA Characterization Wells
- RCRA Regulatory Wells
- RCRA Characterization Wells
- Special Purpose Wells

0 feet 450 900

U.S. Department of Energy
Rocky Flats Plant, Golden, Colorado

West Spray Field

1992 Annual RCRA Groundwater Monitoring Report Addendum

Gross Alpha and Gross Beta Activities (pCi/l) in 1992 Groundwater

Figure 3-1

	1Q	2Q	3Q	4Q
U-233/234	1.878	1.7	1.2	1.7
U-235	BDL	BDL	BDL	BDL
U-238	0.7095	1.4	BDL	0.93

4686
4786

	1Q	2Q	3Q	4Q
U-233/234	BDL	BDL	BDL	BDL
U-235	BDL	BDL	BDL	BDL
U-238	BDL	BDL	BDL	0.49

	1Q	2Q	3Q	4Q
U-233/234	1.014	NA	BDL	0.53
U-235	BDL	NA	BDL	BDL
U-238	0.6382	NA	BDL	0.55

4886

	1Q	2Q	3Q	4Q
U-233/234	NA	NA	0.00126	0.43
U-235	NA	NA	0.000112	BDL
U-238	NA	NA	0.0011	0.37

	1Q	2Q	3Q	4Q
U-233/234	NA	0.002699	NA	0.77
U-235	NA	BDL	NA	0.25
U-238	NA	0.002377	0.8084	0.48

46392

B110989

	1Q	2Q	3Q	4Q
U-233/234	BDL	BDL	BDL	NA
U-235	BDL	BDL	BDL	NA
U-238	BDL	BDL	BDL	6.764

B111189

	1Q	2Q	3Q	4Q
U-233/234	BDL	BDL	BDL	NA
U-235	BDL	BDL	BDL	NA
U-238	BDL	BDL	BDL	BDL

	1Q	2Q	3Q	4Q
U-233/234	NA	NA	BDL	0.65
U-235	NA	NA	BDL	BDL
U-238	NA	NA	BDL	0.49

46292

	1Q	2Q	3Q	4Q
U-233/234	NA	BDL	BDL	1.5
U-235	NA	BDL	BDL	BDL
U-238	NA	BDL	BDL	1.1

	1Q	2Q	3Q	4Q
U-233/234	0.7648	NA	BDL	NA
U-235	BDL	NA	BDL	NA
U-238	BDL	NA	BDL	BDL

B110889

	1Q	2Q	3Q	4Q
U-233/234	BDL	BDL	BDL	0.41
U-235	BDL	BDL	BDL	0.16
U-238	BDL	BDL	BDL	0.37

46192

4886
4986

P415889

	1Q	2Q	3Q	4Q
U-233/234	BDL	BDL	BDL	NA
U-235	BDL	BDL	BDL	NA
U-238	BDL	BDL	BDL	BDL

P415989

B411289

B411389

B410789

5286
5186

	1Q	2Q	3Q	4Q
U-233/234	BDL	BDL	BDL	NA
U-235	BDL	BDL	BDL	NA
U-238	BDL	BDL	BDL	NA

	1Q	2Q	3Q	4Q
U-233/234	BDL	BDL	BDL	BDL
U-235	BDL	BDL	BDL	BDL
U-238	BDL	BDL	BDL	BDL

	1Q	2Q	3Q	4Q
U-233/234	0.8588	BDL	BDL	BDL
U-235	BDL	BDL	BDL	BDL
U-238	0.8136	BDL	BDL	BDL

P416089

P416389

B410689

	1Q	2Q	3Q	4Q
U-233/234	BDL	BDL	BDL	0.17
U-235	BDL	BDL	BDL	0.23
U-238	BDL	BDL	BDL	BDL

	1Q	2Q	3Q	4Q
U-233/234	BDL	0.709	0.918	BDL
U-235	BDL	BDL	BDL	BDL
U-238	BDL	BDL	BDL	BDL

5086

B410589

	1Q	2Q	3Q	4Q
U-233/234	BDL	BDL	BDL	NA
U-235	BDL	BDL	BDL	NA
U-238	BDL	BDL	BDL	BDL

	1Q	2Q	3Q	4Q
U-233/234	1.319	1.061	1.395	1.9
U-235	BDL	BDL	BDL	BDL
U-238	BDL	BDL	0.8394	1.6

B402689

5686

6000 6020 6040 6060 6080

EXPLANATION

- Wells (screened in Surficial Material)
- Wells (screened in Bedrock)
- Compliance Boundary
- Operable Unit Boundary
- Rocky Flats Plant Boundary
- Paved Roads
- Dirt Roads
- Streams, Ditches Drainage Features
- NA Data Not Available
- BDL Below Detection Limit

Detections Shown in Orange Exceed the Sitewide Background Value for that Analyte (e.g.,Am241 **0.056**)

- Surface Water Impoundments
- Buildings
- Background Characterization Wells
- CERCLA Characterization Wells
- RCRA Regulatory Wells
- RCRA Characterization Wells
- Special Purpose Wells

N

0 feet 450 900

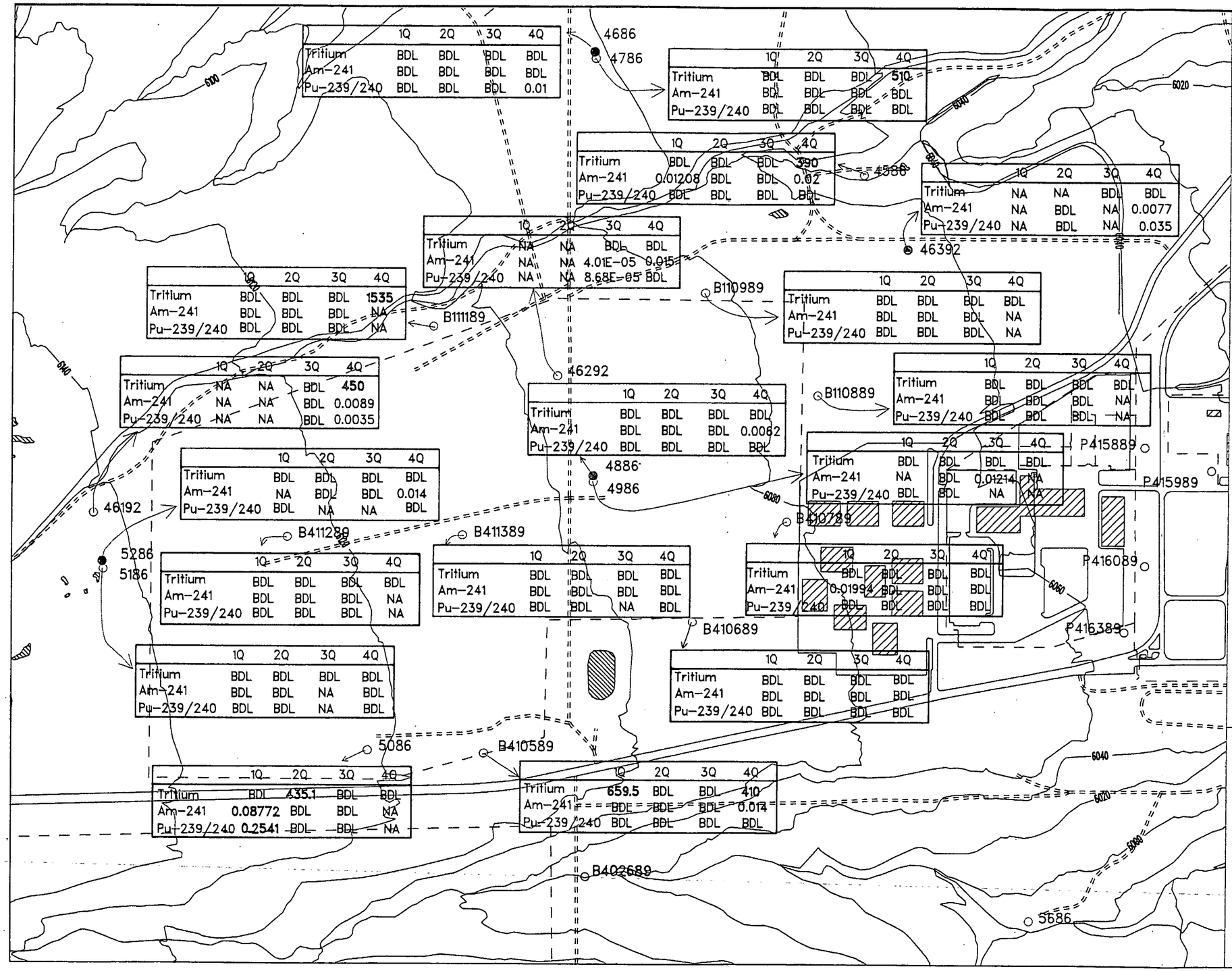
U.S. Department of Energy
Rocky Flats Plant, Golden, Colorado

West Spray Field

1992 Annual RCRA Groundwater Monitoring Report Addendum

Activities of U-233/234, U-235, and U-238 (pCi/l) in 1992 Groundwater

Figure 3-2



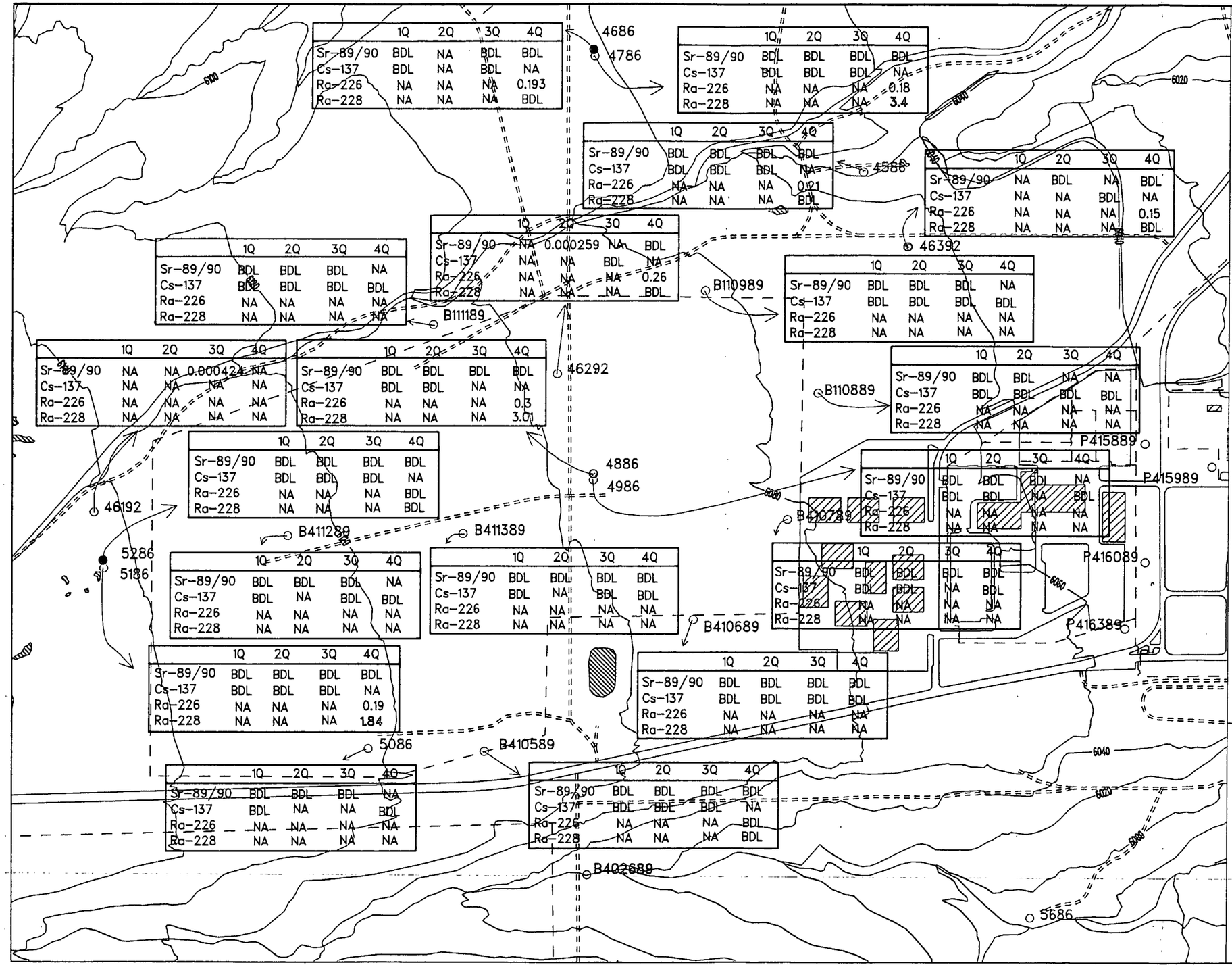
U.S. Department of Energy
Rocky Flats Plant, Golden, Colorado

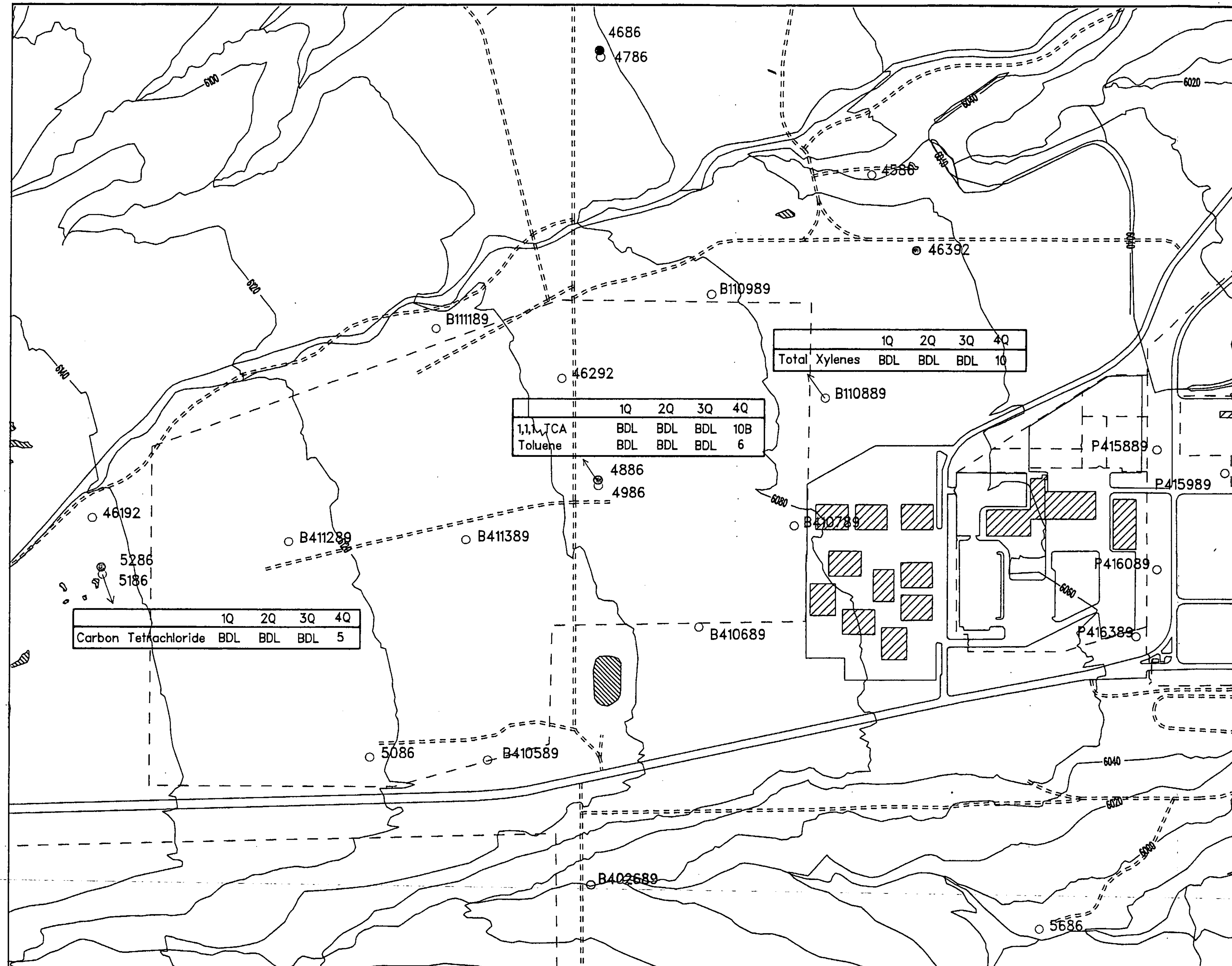
West Spray Field

1992 Annual RCRA Groundwater Monitoring Report Addendum

Activities of Tritium, Am-241, and Pu-239/240 (pCi/l) in 1992 Groundwater

Figure 3-3


4686
4786
1Q 2Q 3Q 4Q
Sr-89/90 BDL NA BDL BDL
Cs-137 BDL NA BDL NA
Ra-226 NA NA NA 0.193
Ra-228 NA NA NA BDL
1Q 2Q 3Q 4Q
Sr-89/90 BDL BDL BDL BDL
Cs-137 BDL BDL BDL NA
Ra-226 NA NA NA 0.18
Ra-228 NA NA NA 3.4
1Q 2Q 3Q 4Q
Sr-89/90 BDL BDL BDL BDL
Cs-137 BDL BDL BDL NA
Ra-226 NA NA NA 0.21
Ra-228 NA NA NA BDL
4586
1Q 2Q 3Q 4Q
Sr-89/90 NA BDL NA BDL
Cs-137 NA NA BDL NA
Ra-226 NA NA NA 0.15
Ra-228 NA NA NA BDL
46392
1Q 2Q 3Q 4Q
Sr-89/90 NA 0.00259 NA BDL
Cs-137 NA NA BDL NA
Ra-226 NA NA NA 0.26
Ra-228 NA NA NA BDL
B110989
1Q 2Q 3Q 4Q
Sr-89/90 BDL BDL BDL NA
Cs-137 BDL BDL BDL BDL
Ra-226 NA NA NA NA
Ra-228 NA NA NA NA
B111189
1Q 2Q 3Q 4Q
Sr-89/90 NA NA 0.000424 NA
Cs-137 NA NA NA NA
Ra-226 NA NA NA NA
Ra-228 NA NA NA NA
1Q 2Q 3Q 4Q
Sr-89/90 BDL BDL BDL BDL
Cs-137 BDL BDL NA NA
Ra-226 NA NA NA 0.3
Ra-228 NA NA NA 3.01
46292
B110889
1Q 2Q 3Q 4Q
Sr-89/90 BDL BDL NA NA
Cs-137 BDL BDL BDL BDL
Ra-226 NA NA NA NA
Ra-228 NA NA NA NA
P415889
P415989
1Q 2Q 3Q 4Q
Sr-89/90 BDL BDL BDL NA
Cs-137 BDL BDL NA BDL
Ra-226 NA NA NA NA
Ra-228 NA NA NA NA
B410789
1Q 2Q 3Q 4Q
Sr-89/90 BDL BDL BDL BDL
Cs-137 BDL BDL BDL NA
Ra-226 NA NA NA NA
Ra-228 NA NA NA NA
P416089
P416389
4886
4986
46192
B411289
B411389
5286
5186
1Q 2Q 3Q 4Q
Sr-89/90 BDL BDL BDL NA
Cs-137 BDL NA BDL BDL
Ra-226 NA NA NA NA
Ra-228 NA NA NA NA
1Q 2Q 3Q 4Q
Sr-89/90 BDL BDL BDL BDL
Cs-137 BDL NA BDL BDL
Ra-226 NA NA NA NA
Ra-228 NA NA NA NA
B410689
1Q 2Q 3Q 4Q
Sr-89/90 BDL BDL BDL BDL
Cs-137 BDL BDL BDL NA
Ra-226 NA NA NA 0.19
Ra-228 NA NA NA 1.84
1Q 2Q 3Q 4Q
Sr-89/90 BDL BDL BDL BDL
Cs-137 BDL BDL BDL BDL
Ra-226 NA NA NA NA
Ra-228 NA NA NA NA
5086
B410589
1Q 2Q 3Q 4Q
Sr-89/90 BDL BDL BDL NA
Cs-137 BDL NA NA BDL
Ra-226 NA NA NA NA
Ra-228 NA NA NA NA
1Q 2Q 3Q 4Q
Sr-89/90 BDL BDL BDL BDL
Cs-137 BDL BDL BDL NA
Ra-226 NA NA NA BDL
Ra-228 NA NA NA BDL
B402689
5686
6020
6040
6060
6080
6100
6120
EXPLANATION
Wells (screened in Surficial Material)
Wells (screened in Bedrock)
Compliance Boundary
Operable Unit Boundary
Rocky Flats Plant Boundary
Paved Roads
Dirt Roads
Streams, Ditches
Drainage Features
NA Data Not Available
BDL Below Detection Limit
Detections Shown in Orange
Exceed the Sitewide Background
Value for that Analyte (e.g.,Am241 0.056)
Surface Water Impoundments
Buildings
Background Characterization Wells
CERCLA Characterization Wells
RCRA Regulatory Wells
RCRA Characterization Wells
Special Purpose Wells
N
0 feet 450 900
U.S. Department of Energy
Rocky Flats Plant, Golden, Colorado
West Spray Field
1992 Annual RCRA Groundwater
Monitoring Report Addendum
Activities of Sr-89/90, Cs-137,
Ra-226, and Ra-228 (pCi/l) in
1992 Groundwater
Figure 3-4



EXPLANATION

- Wells (screened in Surficial Material)
- Wells (screened in Bedrock)
- Compliance Boundary
- Operable Unit Boundary
- Rocky Flats Plant Boundary
- Paved Roads
- Dirt Roads
- Streams, Ditches Drainage Features
- NA Data Not Available
- BDL Below Detection Limit
- B Analyte Also Detected in Method Blank

- Surface Water Impoundments
- Buildings
- **Background Characterization Wells**
- CERCLA Characterization Wells
- RCRA Regulatory Wells
- RCRA Characterization Wells
- Special Purpose Wells

N

0 feet 450 900

U.S. Department of Energy

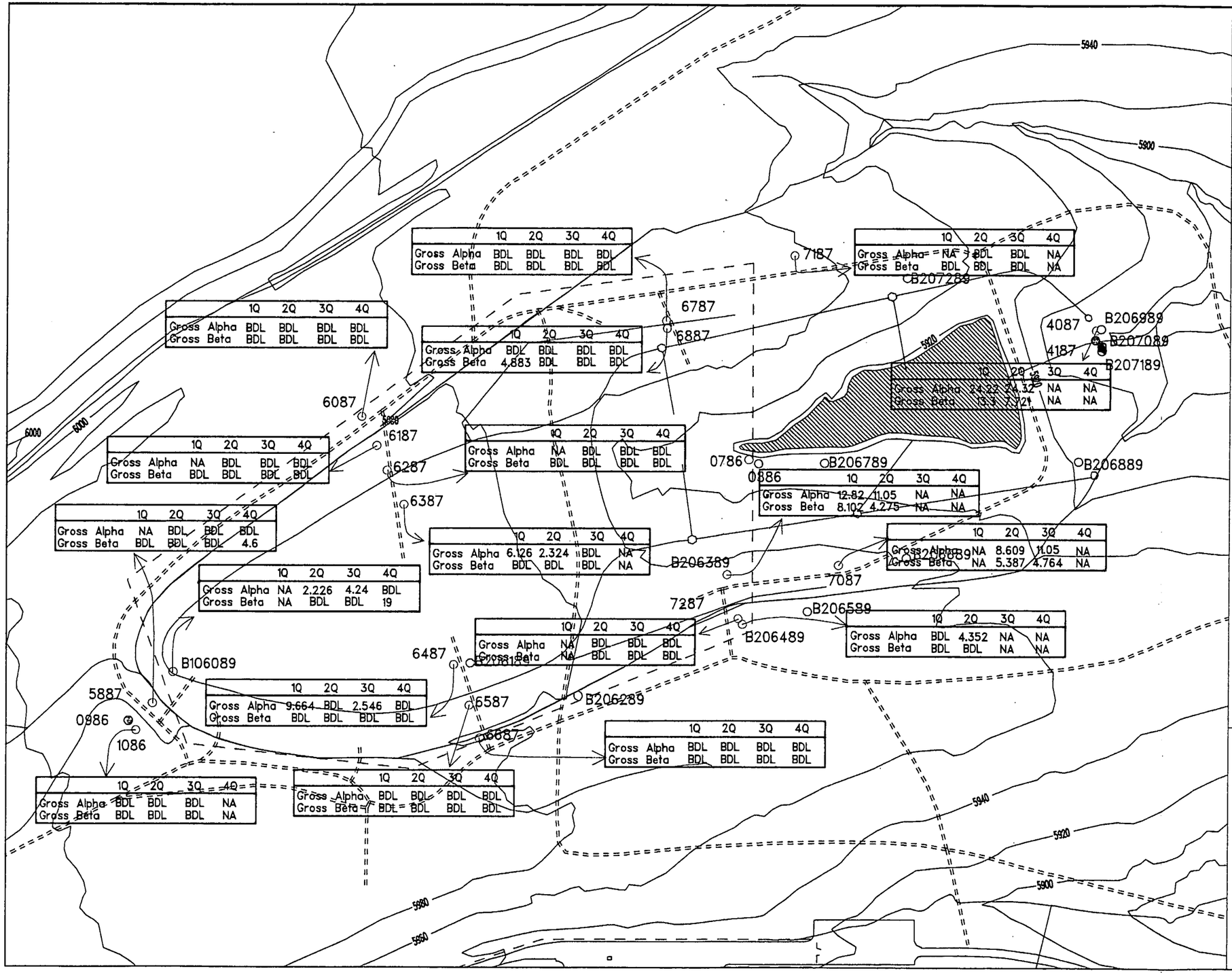
Rocky Flats Plant, Golden, Colorado

West Spray Field

1992 Annual RCRA Groundwater Monitoring Report Addendum

Concentrations of Volatile Organic Compounds (ug/l) in 1992 Groundwater

Figure 3-5



EXPLANATION

- Wells (screened in Surficial Material)
- Wells (screened in Bedrock)
- Compliance Boundary
- Rocky Flats Plant Boundary
- Paved Roads
- Dirt Roads
- Streams, Ditches Drainage Features
- Groundwater Intercept System
- NA — Data Not Available
- BDL — Below Detection Limit

Detections Shown in Orange Exceed the Sitewide Background Value for that Analyte (e.g.,Am241 **0.056**)

- Surface Water Impoundments
- Buildings
- RCRA Regulatory Wells
- RCRA Characterization Wells

0 feet 250 500

U.S. Department of Energy

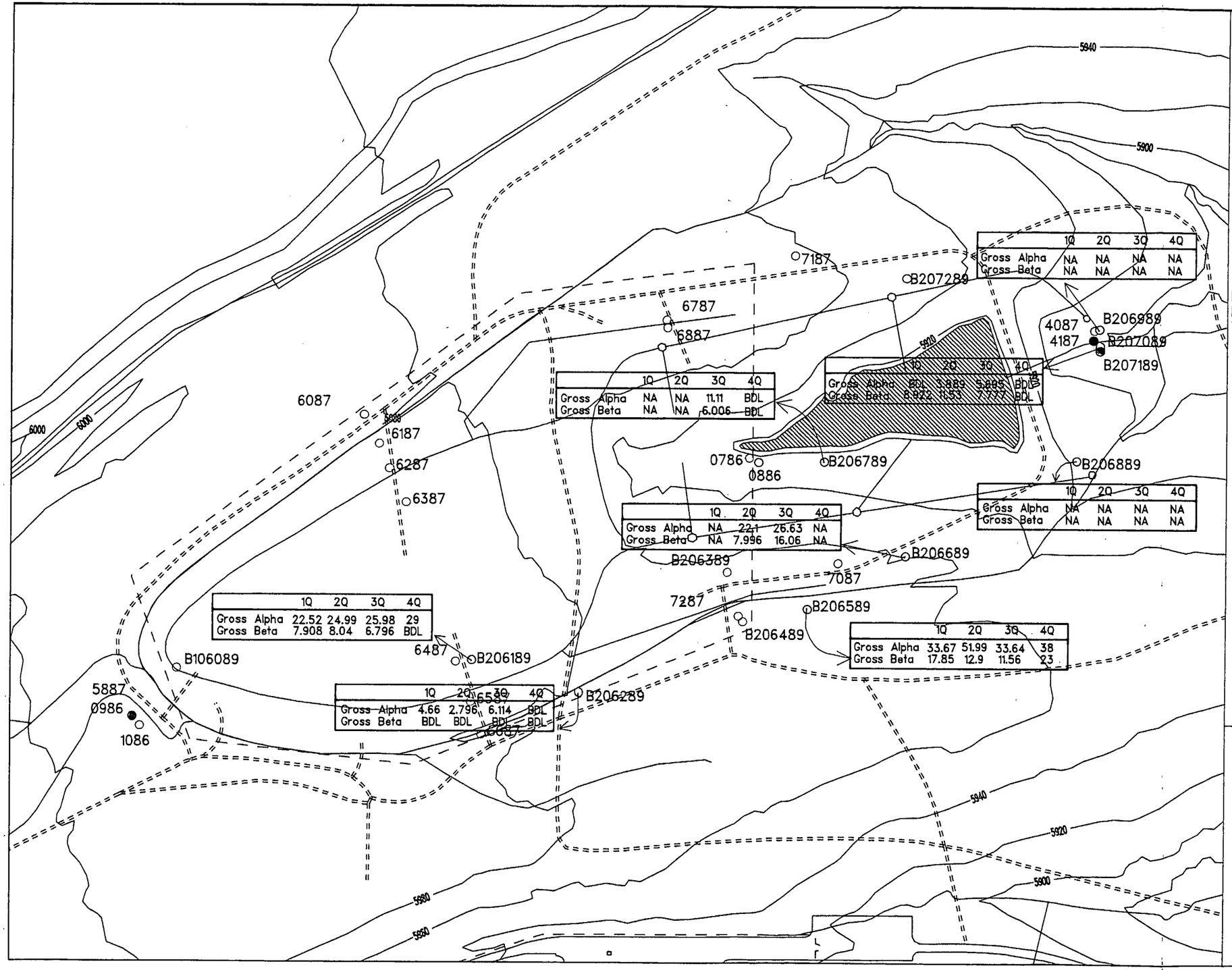
Rocky Flats Plant, Golden, Colorado

Present Landfill

1992 Annual RCRA Groundwater Monitoring Report Addendum

Gross Alpha and Gross Beta Activities (pCi/l) in 1992 Groundwater from Quaternary Materials

Figure 4-1



	1Q	2Q	3Q	4Q
Gross Alpha	NA	NA	11.11	BDL
Gross Beta	NA	NA	6.006	BDL

	1Q	2Q	3Q	4Q
Gross Alpha	BDL	5.889	5.895	BDL
Gross Beta	8.922	11.53	7.777	BDL

	1Q	2Q	3Q	4Q
Gross Alpha	NA	NA	NA	NA
Gross Beta	NA	NA	NA	NA

	1Q	2Q	3Q	4Q
Gross Alpha	NA	22.1	26.63	NA
Gross Beta	NA	7.996	16.06	NA

	1Q	2Q	3Q	4Q
Gross Alpha	NA	NA	NA	NA
Gross Beta	NA	NA	NA	NA

	1Q	2Q	3Q	4Q
Gross Alpha	22.52	24.99	25.98	29
Gross Beta	7.908	8.04	6.796	BDL

	1Q	2Q	3Q	4Q
Gross Alpha	4.66	2.796	6.114	BDL
Gross Beta	BDL	BDL	BDL	BDL

	1Q	2Q	3Q	4Q
Gross Alpha	33.67	51.99	33.64	38
Gross Beta	17.85	12.9	11.56	23

EXPLANATION

- Wells (screened in Surficial Material)
- Wells (screened in Bedrock)
- Compliance Boundary
- Rocky Flats Plant Boundary
- Paved Roads
- Dirt Roads
- Streams, Ditches Drainage Features
- Groundwater Intercept System
- NA — Data Not Available
- BDL — Below Detection Limit

Detections Shown in Orange Exceed the Sitewide Background Value for that Analyte (e.g.,Am241 **0.056**)

- Surface Water Impoundments
- Buildings
- RCRA Regulatory Wells
- RCRA Characterization Wells

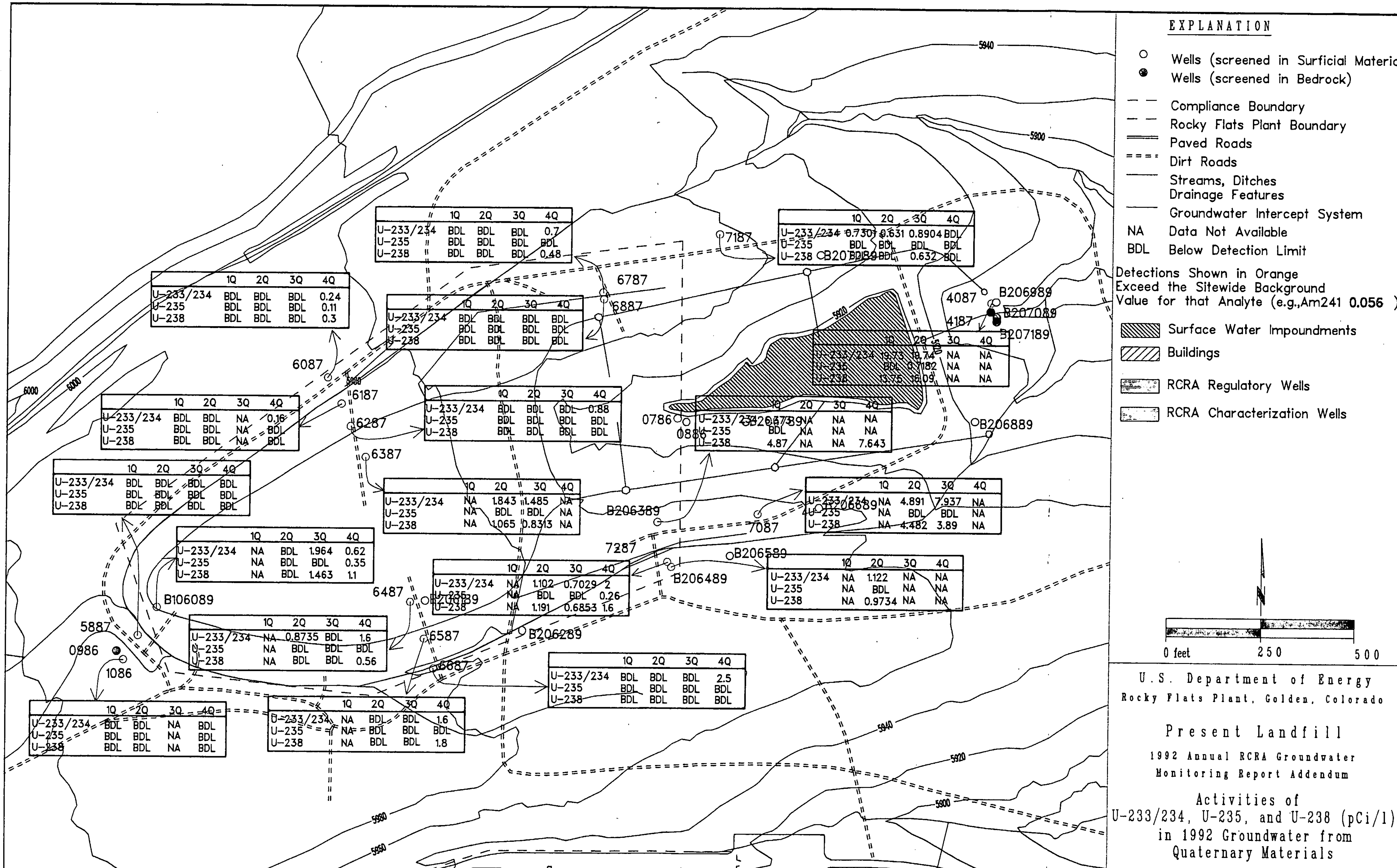
U.S. Department of Energy
Rocky Flats Plant, Golden, Colorado

Present Landfill

1992 Annual RCRA Groundwater Monitoring Report Addendum

Gross Alpha and Gross Beta Activities (pCi/l) in 1992 Groundwater from Weathered Bedrock

Figure 4-2



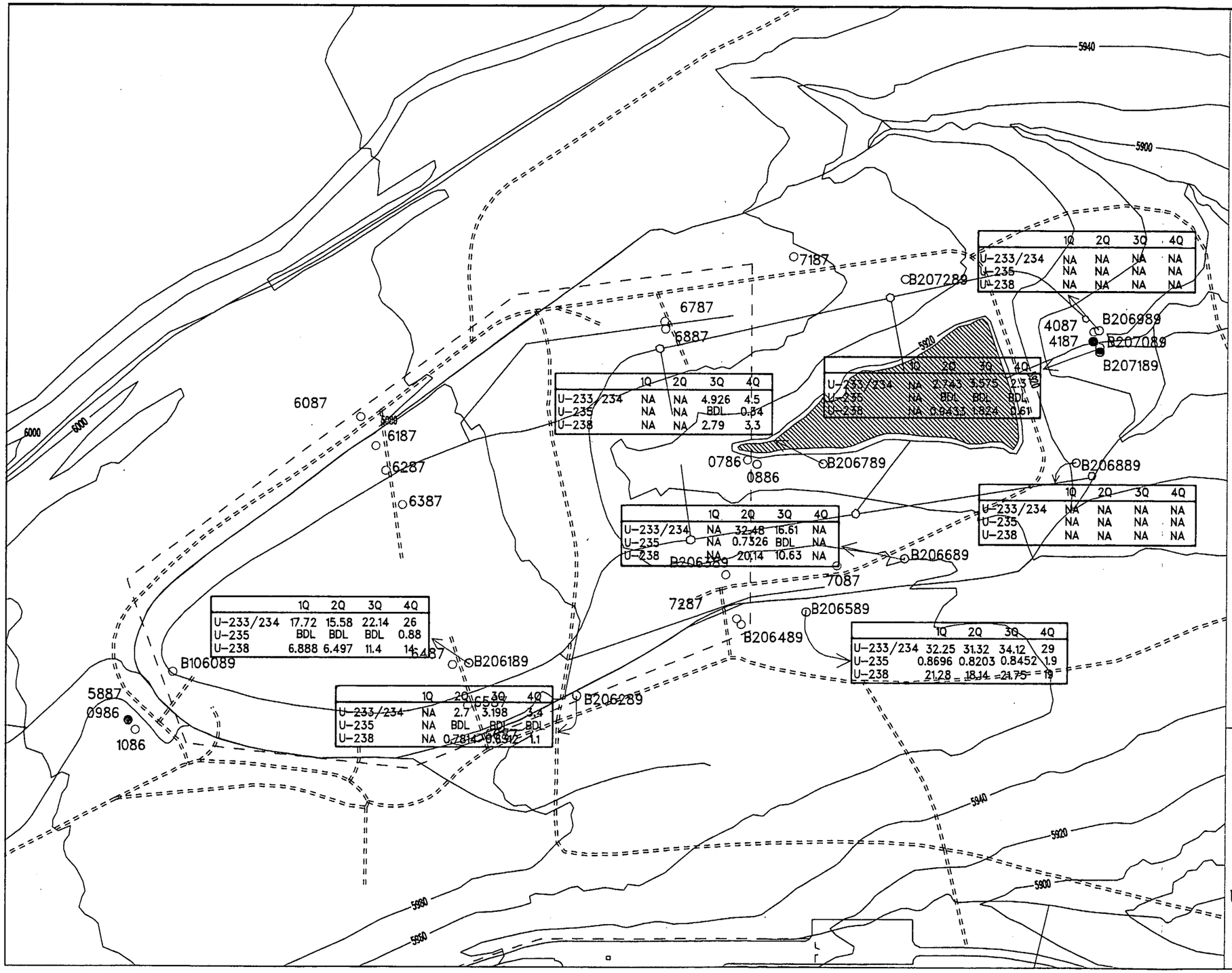
U.S. Department of Energy
Rocky Flats Plant, Golden, Colorado

Present Landfill

1992 Annual RCRA Groundwater Monitoring Report Addendum

Activities of U-233/234, U-235, and U-238 (pCi/l) in 1992 Groundwater from Quaternary Materials

Figure 4-3



U.S. Department of Energy

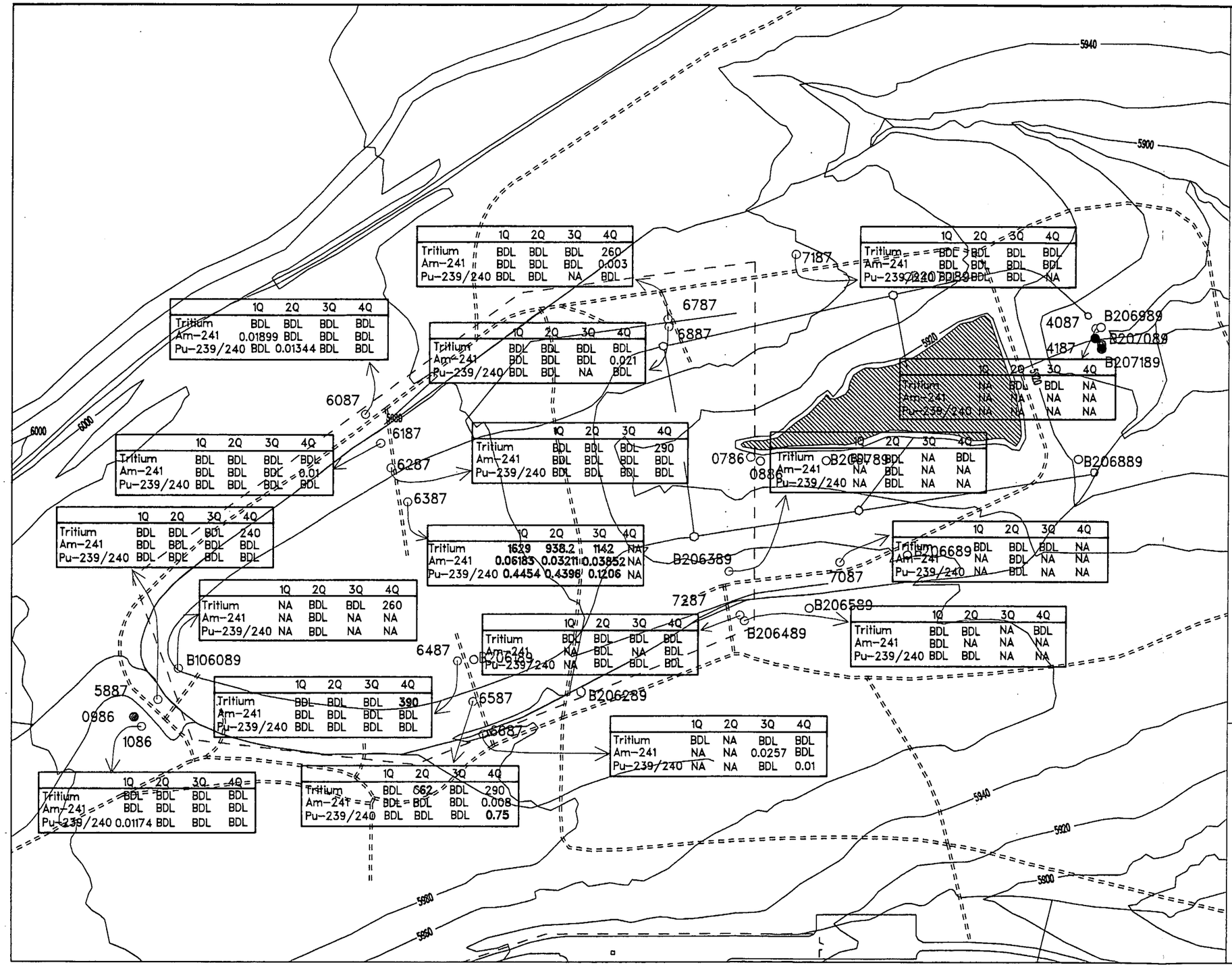
Rocky Flats Plant, Golden, Colorado

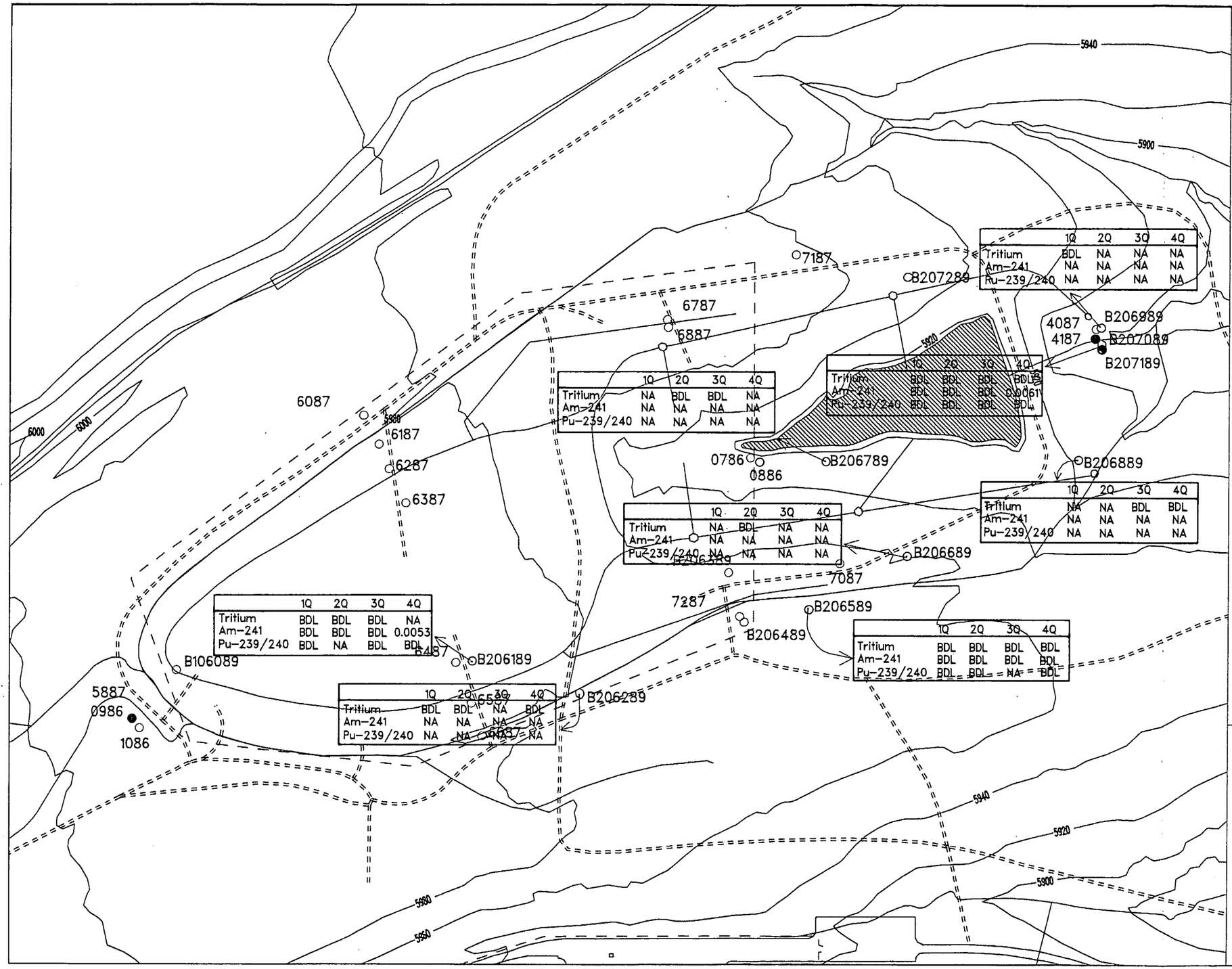
Present Landfill

1992 Annual RCRA Groundwater Monitoring Report Addendum

Activities of U-233/234, U-235, and U-238 (pCi/l) in 1992 Groundwater from Weathered Bedrock

Figure 4-4


6087
	1Q	2Q	3Q	4Q
Tritium	BDL	BDL	BDL	BDL
Am-241	0.01899	BDL	BDL	BDL
Pu-239/240	BDL	0.01344	BDL	BDL
6187
	1Q	2Q	3Q	4Q
Tritium	BDL	BDL	BDL	BDL
Am-241	BDL	BDL	BDL	0.01
Pu-239/240	BDL	BDL	BDL	BDL
6287
	1Q	2Q	3Q	4Q
Tritium	BDL	BDL	BDL	240
Am-241	BDL	BDL	BDL	BDL
Pu-239/240	BDL	BDL	BDL	BDL
6387
	1Q	2Q	3Q	4Q
Tritium	1629	938.2	1142	NA
Am-241	0.06183	0.03211	0.03852	NA
Pu-239/240	0.4454	0.4396	0.1206	NA
6487
	1Q	2Q	3Q	4Q
Tritium	NA	BDL	BDL	260
Am-241	NA	BDL	NA	NA
Pu-239/240	NA	BDL	NA	NA
6587
	1Q	2Q	3Q	4Q
Tritium	BDL	BDL	BDL	390
Am-241	BDL	BDL	BDL	BDL
Pu-239/240	BDL	BDL	BDL	BDL
6687
	1Q	2Q	3Q	4Q
Tritium	BDL	662	BDL	290
Am-241	BDL	BDL	BDL	0.008
Pu-239/240	BDL	BDL	BDL	0.75
6787
	1Q	2Q	3Q	4Q
Tritium	BDL	BDL	BDL	260
Am-241	BDL	BDL	BDL	0.003
Pu-239/240	BDL	BDL	NA	BDL
6887
	1Q	2Q	3Q	4Q
Tritium	BDL	BDL	BDL	BDL
Am-241	BDL	BDL	BDL	0.021
Pu-239/240	BDL	BDL	NA	BDL
6987
	1Q	2Q	3Q	4Q
Tritium	BDL	BDL	BDL	290
Am-241	BDL	BDL	BDL	BDL
Pu-239/240	BDL	BDL	BDL	BDL
7187
	1Q	2Q	3Q	4Q
Tritium	BDL	BDL	BDL	BDL
Am-241	BDL	BDL	BDL	BDL
Pu-239/240	BDL	BDL	BDL	NA
7287
	1Q	2Q	3Q	4Q
Tritium	BDL	BDL	BDL	BDL
Am-241	NA	BDL	NA	BDL
Pu-239/240	NA	BDL	BDL	BDL
7087
	1Q	2Q	3Q	4Q
Tritium	BDL	BDL	NA	BDL
Am-241	BDL	NA	NA	NA
Pu-239/240	BDL	BDL	NA	NA
6689
	1Q	2Q	3Q	4Q
Tritium	BDL	BDL	BDL	NA
Am-241	NA	BDL	NA	NA
Pu-239/240	NA	BDL	NA	NA
0786
	1Q	2Q	3Q	4Q
Tritium	BDL	BDL	NA	BDL
Am-241	NA	BDL	NA	NA
Pu-239/240	NA	BDL	NA	NA
0886
	1Q	2Q	3Q	4Q
Tritium	BDL	BDL	BDL	240
Am-241	BDL	BDL	BDL	BDL
Pu-239/240	BDL	BDL	BDL	BDL
0986
	1Q	2Q	3Q	4Q
Tritium	BDL	BDL	BDL	BDL
Am-241	BDL	BDL	BDL	BDL
Pu-239/240	0.01174	BDL	BDL	BDL
1086
	1Q	2Q	3Q	4Q
Tritium	BDL	NA	BDL	BDL
Am-241	NA	NA	0.0257	BDL
Pu-239/240	NA	NA	BDL	0.01
4087
	1Q	2Q	3Q	4Q
Tritium	NA	BDL	BDL	NA
Am-241	NA	NA	NA	NA
Pu-239/240	NA	NA	NA	NA
4187
B206989
B207089
B207189
B206889
B206389
B206489
B206589
B206289
B106089
5940
5920
5900
5880
5860
6000
5980
5960
5940
5920
5900
5880
5860
EXPLANATION
Wells (screened in Surficial Material)
Wells (screened in Bedrock)
Compliance Boundary
Rocky Flats Plant Boundary
Paved Roads
Dirt Roads
Streams, Ditches Drainage Features
Groundwater Intercept System
NA Data Not Available
BDL Below Detection Limit
Detections Shown in Orange Exceed the Sitewide Background Value for that Analyte (e.g.,Am241 0.056)
Surface Water Impoundments
Buildings
RCRA Regulatory Wells
RCRA Characterization Wells
0 feet
250
500
U.S. Department of Energy
Rocky Flats Plant, Golden, Colorado
Present Landfill
1992 Annual RCRA Groundwater Monitoring Report Addendum
Activities of Tritium, Am-241, and Pu-239/240 (pCi/l) in 1992 Groundwater from Quaternary Materials
Figure 4-5



EXPLANATION

- Wells (screened in Surficial Material)
- Wells (screened in Bedrock)
- Compliance Boundary
- Rocky Flats Plant Boundary
- Paved Roads
- Dirt Roads
- Streams, Ditches Drainage Features
- Groundwater Intercept System
- NA Data Not Available
- BDL Below Detection Limit

Detections Shown in Orange Exceed the Sitewide Background Value for that Analyte (e.g.,Am241 **0.056**)

- Surface Water Impoundments
- Buildings
- RCRA Regulatory Wells
- RCRA Characterization Wells

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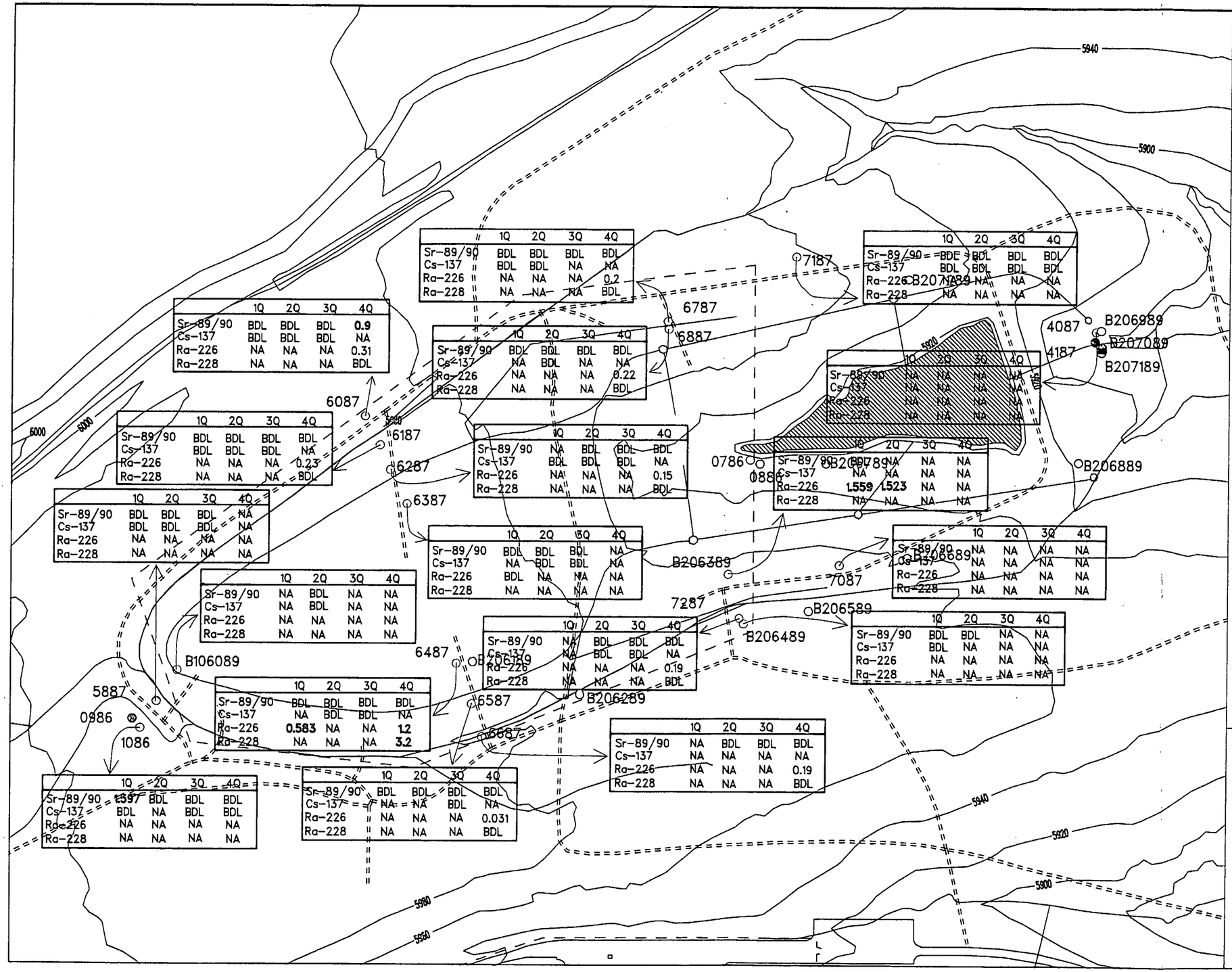
Activities of Tritium, Am-241, and Pu-239/240 (pCi/l) in 1992 Groundwater from Weathered Bedrock

Figure 4-6



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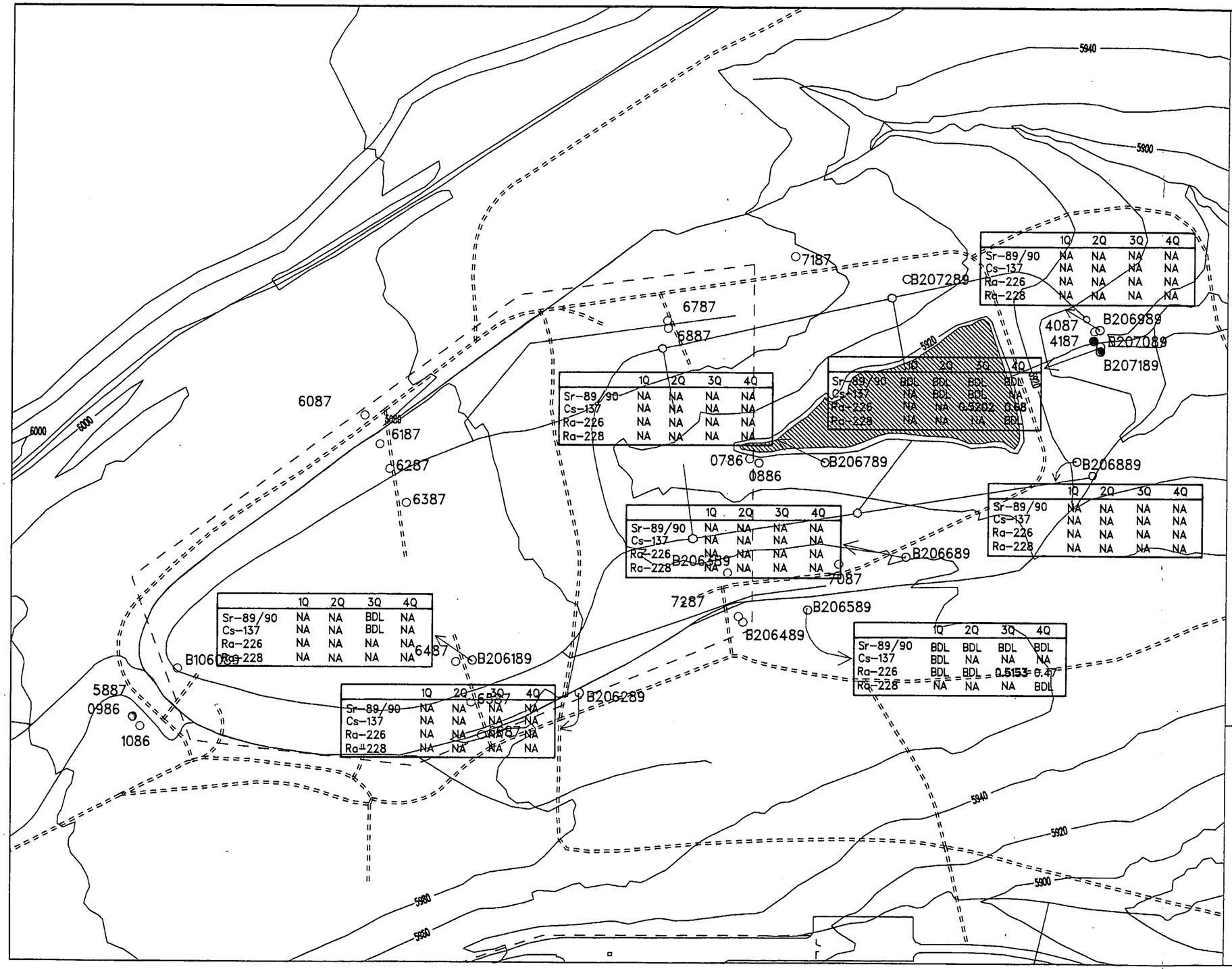
Activities of Sr-89/90, Cs-137, Ra-226, and Ra-228 (pCi/l) in 1992 Groundwater from Quaternary Materials

Figure 4-7



	1Q	2Q	3Q	4Q
Sr-89/90	NA	NA	NA	NA
Cs-137	NA	NA	NA	NA
Ra-226	NA	NA	NA	NA
Ra-228	NA	NA	NA	NA

	1Q	2Q	3Q	4Q
Sr-89/90	BDL	BDL	BDL	BDL
Cs-137	NA	BDL	BDL	NA
Ra-226	NA	NA	0.5202	0.68
Ra-228	NA	NA	NA	BDL

	1Q	2Q	3Q	4Q
Sr-89/90	NA	NA	NA	NA
Cs-137	NA	NA	NA	NA
Ra-226	NA	NA	NA	NA
Ra-228	NA	NA	NA	NA

	1Q	2Q	3Q	4Q
Sr-89/90	NA	NA	NA	NA
Cs-137	NA	NA	NA	NA
Ra-226	NA	NA	NA	NA
Ra-228	NA	NA	NA	NA

	1Q	2Q	3Q	4Q
Sr-89/90	NA	NA	BDL	NA
Cs-137	NA	NA	BDL	NA
Ra-226	NA	NA	NA	NA
Ra-228	NA	NA	NA	NA

	1Q	2Q	3Q	4Q
Sr-89/90	NA	NA	NA	NA
Cs-137	NA	NA	NA	NA
Ra-226	NA	NA	NA	NA
Ra-228	NA	NA	NA	NA

	1Q	2Q	3Q	4Q
Sr-89/90	BDL	BDL	BDL	BDL
Cs-137	BDL	NA	NA	NA
Ra-226	BDL	BDL	0.5153	0.47
Ra-228	NA	NA	NA	BDL

EXPLANATION

- Wells (screened in Surficial Material)
- Wells (screened in Bedrock)
- Compliance Boundary
- Rocky Flats Plant Boundary
- Paved Roads
- Dirt Roads
- Streams, Ditches Drainage Features
- Groundwater Intercept System
- NA — Data Not Available
- BDL — Below Detection Limit

Detections Shown in Orange Exceed the Sitewide Background Value for that Analyte (e.g.,Am241 **0.056**)

- Surface Water Impoundments
- Buildings
- RCRA Regulatory Wells
- RCRA Characterization Wells

0 feet 250 500

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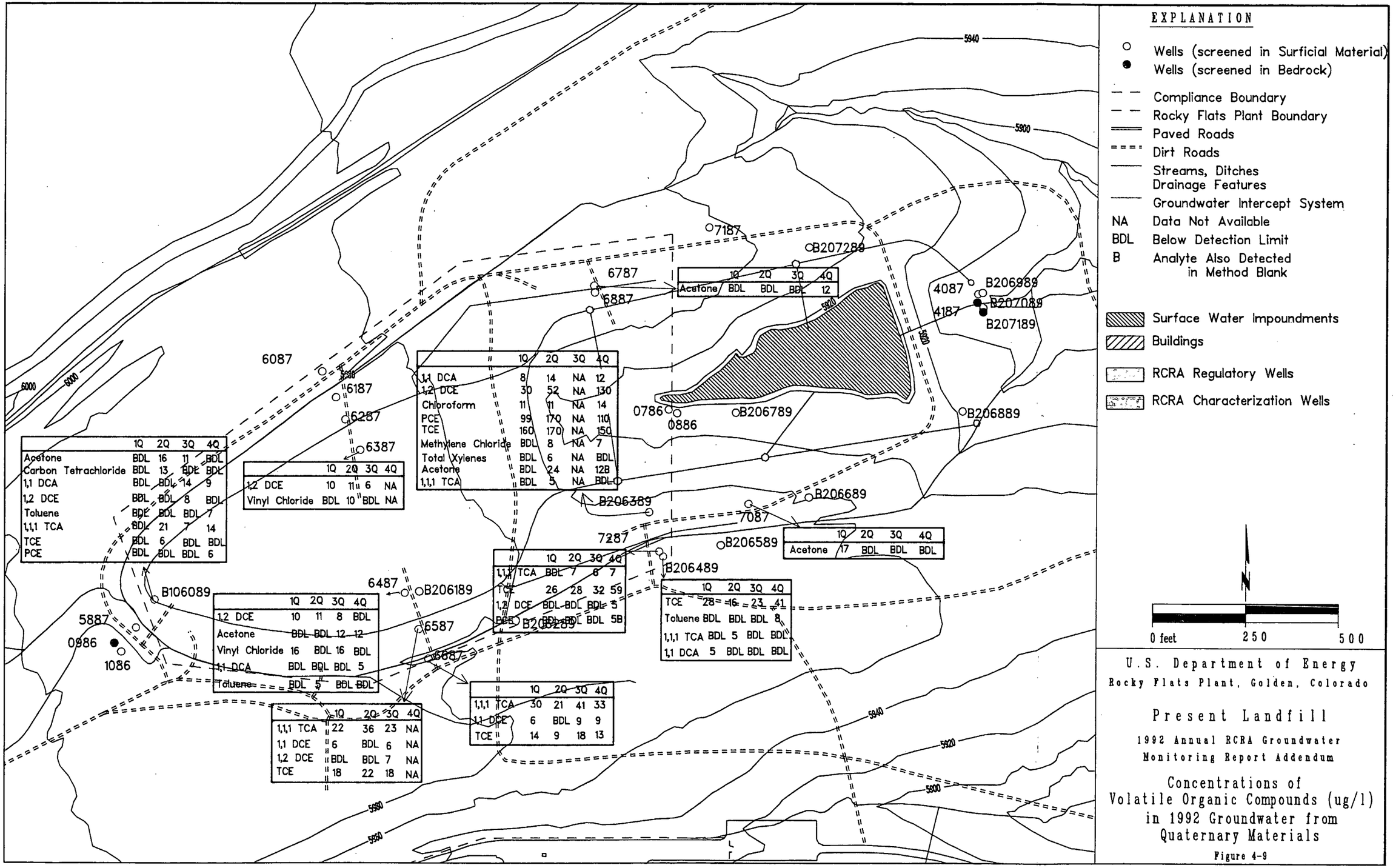
Activities of Sr-89/90, Cs-137, Ra-226, and Ra-228 (pCi/l) in 1992 Groundwater from Weathered Bedrock

Figure 4-8



	1Q	2Q	3Q	4Q
Acetone	BDL	16	11	BDL
Carbon Tetrachloride	BDL	13	BDL	BDL
1,1 DCA	BDL	BDL	14	9
1,2 DCE	BDL	BDL	8	BDL
Toluene	BDL	BDL	BDL	7
1,1,1 TCA	BDL	21	7	14
TCE	BDL	6	BDL	BDL
PCE	BDL	BDL	BDL	6

	1Q	2Q	3Q	4Q
1,2 DCE	10	11	6	NA
Vinyl Chloride	BDL	10	BDL	NA

	1Q	2Q	3Q	4Q
1,1 DCA	8	14	NA	12
1,2 DCE	30	52	NA	130
Chloroform	11	11	NA	14
PCE	99	170	NA	110
TCE	160	170	NA	150
Methylene Chloride	BDL	8	NA	7
Total Xylenes	BDL	6	NA	BDL
Acetone	BDL	24	NA	12B
1,1,1 TCA	BDL	5	NA	BDL

	1Q	2Q	3Q	4Q
Acetone	BDL	BDL	BDL	12

	1Q	2Q	3Q	4Q
1,2 DCE	10	11	8	BDL
Acetone	BDL	BDL	12	12
Vinyl Chloride	16	BDL	16	BDL
1,1 DCA	BDL	BDL	BDL	5
Toluene	BDL	5	BDL	BDL

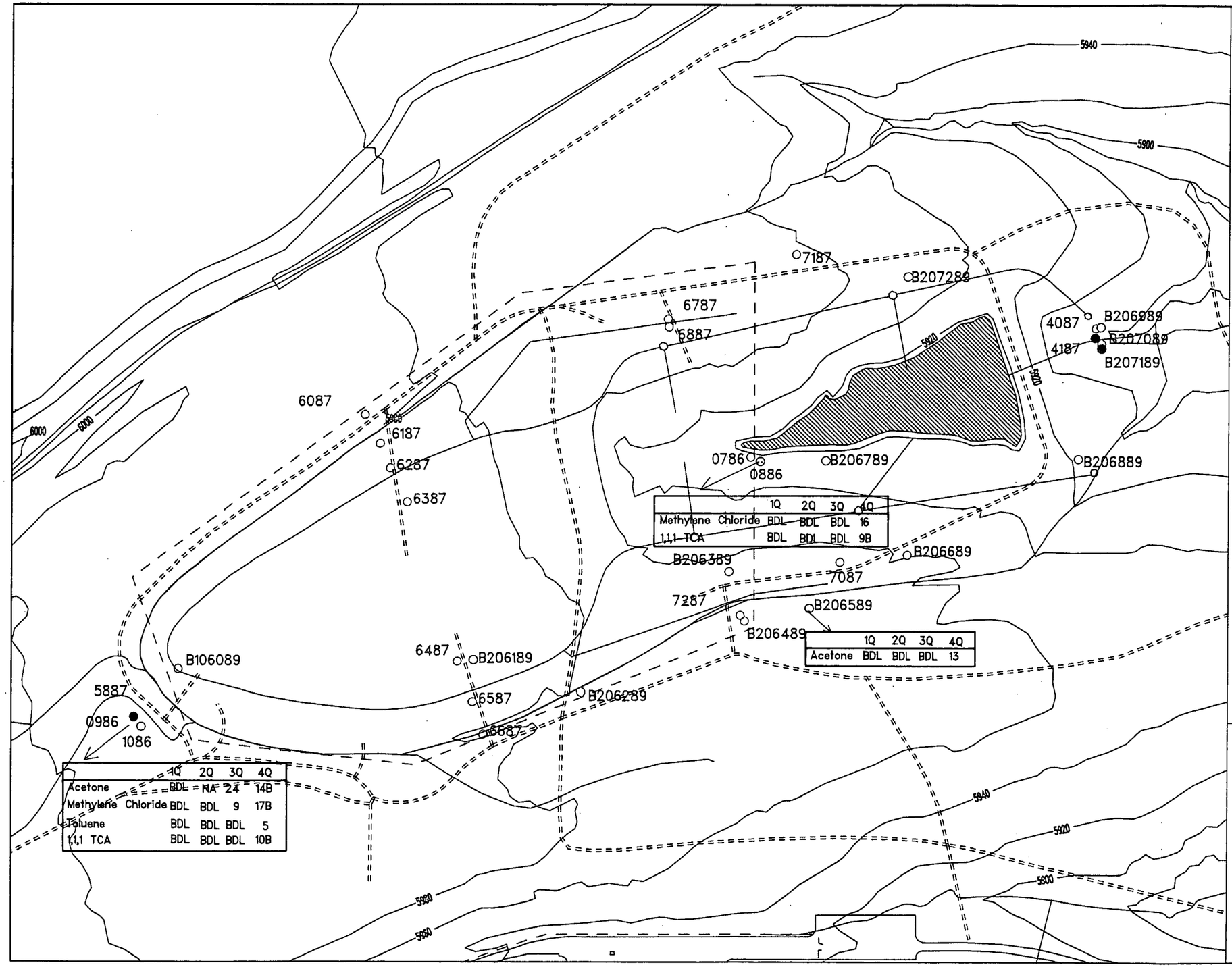
	1Q	2Q	3Q	4Q
1,1,1 TCA	22	36	23	NA
1,1 DCE	6	BDL	6	NA
1,2 DCE	BDL	BDL	7	NA
TCE	18	22	18	NA

	1Q	2Q	3Q	4Q
1,1,1 TCA	BDL	7	6	7
TCE	26	28	32	59
1,2 DCE	BDL	BDL	BDL	5
PCE	BDL	BDL	BDL	5B

	1Q	2Q	3Q	4Q
1,1,1 TCA	30	21	41	33
1,1 DCE	6	BDL	9	9
TCE	14	9	18	13

	1Q	2Q	3Q	4Q
TCE	28	16	23	41
Toluene	BDL	BDL	BDL	8
1,1,1 TCA	BDL	5	BDL	BDL
1,1 DCA	5	BDL	BDL	BDL

	1Q	2Q	3Q	4Q
Acetone	17	BDL	BDL	BDL



EXPLANATION

- Wells (screened in Surficial Material)
- Wells (screened in Bedrock)
- Compliance Boundary
- Rocky Flats Plant Boundary
- Paved Roads
- Dirt Roads
- Streams, Ditches Drainage Features
- Groundwater Intercept System
- NA Data Not Available
- BDL Below Detection Limit
- B Analyte Also Detected in Method Blank
- Surface Water Impoundments
- Buildings
- RCRA Regulatory Wells
- RCRA Characterization Wells

0 feet 250 500

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Concentrations of Volatile Organic Compounds (ug/l) in 1992 Groundwater from Weathered Bedrock

Figure 4-10